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Information and Communication Technologies Use by Agriscience Teachers in Trinidad and Tobago

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The purpose of this study was to investigate information and communication technologies (ICT) usage among Agriscience teachers in Trinidad and Tobago. This knowledge will be used to develop preservice and inservice professional development programming for these teachers. Eighty-five percent (n = 77) of the secondary Agriscience teachers responded to a survey that assessed: (a) technology current use, (b) technology beliefs, (c) technology skills, (d) technology intentions, (e) barriers to technology use, and (f) personal data. Results indicated that Agriscience teachers in Trinidad have accepted ICT as useful tools. Teachers used ICT most frequently for personal reasons and less frequently for school-related tasks. Teachers generally believed that ICT help them accomplish tasks more quickly, enhance their quality of work, were easy to use, and that it could help to keep in touch with their students. However, beliefs varied based on age, career intentions, and computer literacy. Agriscience teachers also indicated that they possessed moderate skill levels and intend to use ICT as a part of their jobs. Differences in perceived skills were noted based on age, experience, and career intentions. Primary barriers centered on technical issues such as lack of hardware, inadequate technical infrastructure, and connectivity. Additionally, teachers believed that lack of a reward structure impeded technology usage.

Keywords: Agriscience Teachers; ICT; Information and Communication Technologies; Trinidad and Tobago

Introduction

Trinidad and Tobago is a twin island nation located in the Caribbean Region. Classified as a developing nation, Trinidad and Tobago is working to reach developed nation status by 2020 (UNESCO, n.d.). One component of this goal is agricultural development, which includes developing sufficient human capacity to meet current and future needs (Rivera & Alex, 2008). The Food and Agriculture Organization (FAO) of the United Nations (1997) recognized that secondary agricultural education can be an important component of this system. Specifically in Trinidad and Tobago, Ramdwar and Ganpat (2010) purported that secondary-level agriscience education is being pursued to develop the next generation of skilled agriculturists.

As Rivera and Alex (2008) noted, formal educational efforts are one piece of a larger human capacity system for an agricultural sector. In Trinidad and Tobago, formal agricultural education is offered at the primary level (5–11 years old), secondary level (12–17 years), and tertiary level (17 years and older) with the goal across all these levels being to help students develop appropriate skills to meet current and future industry needs (Ramdwar & Ganpat, 2010). One such skillset focuses on information and communication technologies (ICT), hardware and software technologies that allow for communicating, creating, storing, and sharing of information (Gulbahar & Guven, 2008).

Ultimately, future workers in the agricultural sector of Trinidad and Tobago will need to be proficient at using ICT. Secondary school-level agriscience education programs offer an excellent platform to nurture these skills. However, for this to occur, agriscience teachers in these programs must themselves possess the appropriate subject matter knowledge in using these technologies (Roberts & Kitchel, 2010). The current level of ICT proficiency among agriscience teachers in Trinidad and Tobago is unknown. Such knowledge could guide both preservice and inservice teacher education programming.

Theoretical Framework

Venkatesh and Davis's (2000) extension of the *Technology Acceptance Model*, also known as TAM2 (Figure 1), framed this study. TAM2 is based upon the original work of Davis (1986). Davis's original *Technology Acceptance Model* (TAM) theorized that an individual's behavioral intention to use a technology was influenced by two beliefs: (a) perceived usefulness and (b) perceived ease of use (Venkatesh & Davis, 2000). The authors also defined perceived usefulness "as the extent to which a person believes that using the system [or technology] will enhance his or her job performance" (p. 187) and perceived ease of use was defined "as the extent to which a person believes that using the system [or technology] will be free of effort" (p. 187). TAM suggests "the effects of external variables (e.g., system characteristics, development process, training) on intention to use are mediated by perceived usefulness and perceived ease of use" (p. 187). Additionally, TAM suggested that perceived ease of use is influenced by perceived usefulness since the "easier the system [or technology] is to use the more useful it can be" (p. 187).

TAM2 builds upon TAM by adding the following theoretical constructs: (a) subjective norm, (b) image, (c) voluntariness, (d) job relevance, (e) output quality, and (f) result demonstrability (Venkatesh & Davis, 2000). Subjective norm, image, and voluntariness are characterized as social influence processes that impact an individual's adoption or rejection of a technology, and job relevance, output quality, result demonstrability, and perceived ease of use as cognitive instrumental processes of perceived usefulness (Venkatesh & Davis, 2000). The subjective norm is a "person's perception that most people who are important to him think he should or should not perform the behavior in question" (p. 187); image is the "degree to which use of an innovation is perceived to enhance one's… status in one's social system" (p. 189); voluntariness is the "extent to which potential adopters perceived the adoption decision to be non-mandatory" (p. 188); job relevance is an "individual's perception regarding the degree to which the target system [or technology] is applicable to his or her job" (p. 191); output quality is a person's perception of the "tasks a system [or technology] is capable of performing and the degree to which those tasks match their job goals (job relevance)" (p. 191); result demonstrability is the ability of a person to "attribute the gains in their job performance specifically to their use of the system" (p. 192) or technology. The influences of the aforementioned theoretical constructs on perceived usefulness and intention to use a technology are illustrated in the Figure 1.

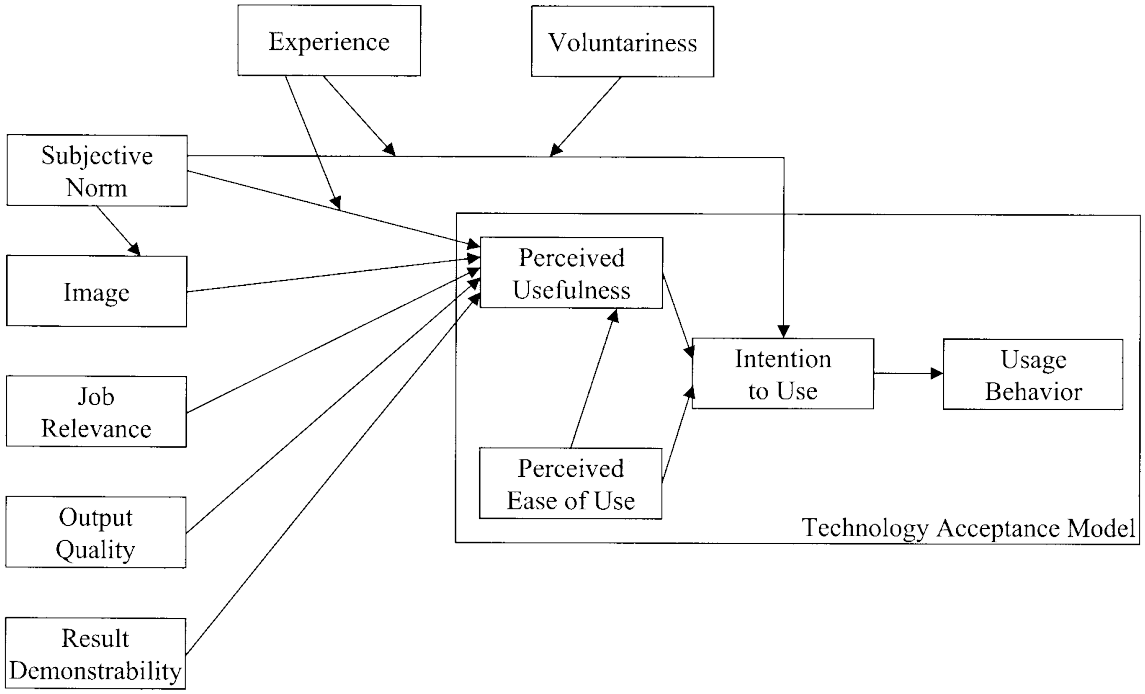

Figure 1. TAM2 (Venkatesh & Davis, 2000, p. 188)

Literature Review

ICT usage in Trindad and Tobago has been examined by several researchers. In a survey of the Waterloo Secondary School in Trinidad, Warner (2010) reported the secondary school utilized "available educational technological software as tools of motivation, encouragement, knowledge, communication and collaboration" (p. 137). Additionally, Warner reported that a survey of parents indicated 82% of the respondents had a computer but only 60% had Internet access. Parents also indicated they wanted the school curricula to include ICT (Warner, 2010). Waterloo Secondary School student council members suggested a weekly elective period be added to the school's schedule to allow students to learn skills like ICT, and teachers proposed ICT training should be on-going and not a one-time workshop (Warner, 2010). Furthermore, the local school board and alumni of the secondary school stated that teachers should make better use of existing technology resources (Warner, 2010).

Rampersad (2011) sought to determine if the mandated incorporation of ICT in a modern studies department had a positive impact on teaching and learning at an urban secondary school in Trinidad. Rampersad found teachers were using a variety of ICT during instruction (PowerPoint, audio clips, live streaming, wikis, and pictures) and during all major segments of a lesson (introduction, learning activities, and summary). Most of the teachers believed ICT is useful in making subjects more interesting, reaching a diverse set of learners, facilitating student-centered learning environments, developing deeper conceptual understanding of the content, increasing communication between teachers and students, managing and storing instructional material, and is an "excellent tool for repetition and reinforcement of content and skills taught" (Rampersad, 2011, p. 41). In addition, most of the teachers felt ICT allowed them to deliver content at a faster pace, but required more creativity and planning time. However, Rampersad reported that one teacher stated

ICT were not effective for teaching abstract, highly theoretical topics, and some teachers indicated that technical problems reduced instructional time and a back-up plan should be developed. Many of the teachers also felt they lacked the technical competence needed to deal with technical issues and the pedagogical knowledge necessary to more effectively utilize ICT (Rampersad, 2011). Furthermore, Rampersad found teachers believe students expected ICT to be used during instruction, are not as interested when ICT is not incorporated, and tend to believe information not presented with ICT is not important. Additional concerns related to students and ICT use were the lack of interest in reading created by using ICT, plagiarism, loss of formal writing and research skills, and the distraction of the technology itself. Overall, Rampersad reported "ICT offered excellent tools to both the teacher and the learner and its use contributed positively to both teaching and learning" (p. 66).

In a study of a secondary school in Port of Spain, Trinidad, Phillip (2007) reported that teachers and administrators believed the benefits of utilizing ICT outweighed the cost of purchasing ICT equipment. However, teachers and administrators were concerned about the physical security of the technology and the security of student information stored on the technology (Phillip, 2007). Phillip also reported teachers and administrators believed the effectiveness of ICT depended on the ICT competencies of the entire staff and noted that the level of ICT competency of the staff varied greatly. In addition, Phillip found younger teachers were more likely to be competent than older teachers, and many older teachers believed ICT skills would not be of benefit to them this late in their career. Phillip purported ICT competencies and skills must be included in the curriculum of Trinidad and Tobago's secondary schools. Phillip (2007) further claimed that ICT

> affects every aspect of students' activity, and the delivery of ICT skills and competencies are indispensable if we are to fulfil [*sic*] the obligation to produce students who are equipped to compete successfully in the highly competitive international environment created by the harsh realities of globalization. (p. 146)

Also in Trinidad and Tobago, Ragoonanan (2012) investigated primary school teachers' perceptions and competencies in regard to ICT and science education. Ragoonanan found the teachers did not use ICT because of a lack of technical and pedagogical knowledge and skill. However, after professional development, the primary teachers had a positive shift in their "perceptions of integrating ICT in science, and improved levels of technical and pedagogical competencies, confidence, and reflective practices" (p. 1). Similarly, Beeput (2012) examined school administrators and primary teachers' perceptions of ICT and teacher training in three Trinidad educational district. School administrators and primary teachers were found to possess a limited view of how ICT could be utilized. In addition, the administrators and teachers believed teacher-preparation programs were ill-prepared for integrating ICT into the primary school curriculum. What is more, Khan (2012) reported four rural primary school teachers in Trinidad and Tobago believed "accessibility to hardware and software, teacher competence, professional development, school policy, and space and time" (p. 1) impeded their use of ICT.

ICT usage among secondary agriscience education teachers has received little attention in the international

agricultural and extension education literature. In 2002, Shao and Bruening reported that Chinese agricultural schools were using more multimedia aids than in the past. However, in 2005 Shao and Bruening found that agriscience teachers in China had a lack of expertise in educational technologies. In 2003, Lu and Miller compared instructional technology competence between teachers in Ohio and Taiwan. Teachers had the greatest needs for database development and telecommunications. Demographic variables such as age, gender, years of teaching, and highest degree attained had low or negligible associations with teacher needs. There were no studies found that examined ICT as implemented in the agriscience program in Trinidad and Tobago.

Purpose and Objectives

The purpose of this study was to investigate ICT usage among agriscience teachers in Trinidad and Tobago. This knowledge will be used to develop preservice and inservice professional development programming for these teachers. The specific objectives were to:

1. Describe the level of technology use, beliefs, skills, and intentions by agriscience teachers in Trinidad and Tobago.
2. Describe the barriers to increased technology use.
3. Identify personal and school-related factors that impact technology use, beliefs, skills, and intentions.

Methodology

A survey research investigation was done among agriscience teachers in Trinidad and Tobago to assess issues related to the use of technology in agricultural science education. Agriscience is taught at the secondary level, which caters for students 12–17 years. The list provided by the Ministry of Education showed that 82 schools offered the subject with a total of 90 teachers. This constituted the study population. The research targeted all teachers employed in 2012, thus constituting a slice-in-time sample (Oliver & Hinkle, 1982). Survey instruments were hand delivered to all schools and follow up calls were made before eventual retrieval by hand. A total of 77 teachers completed the instrument, giving a response rate of 85.5%.

Adapted from the work of Gulbahar and Guven (2008), the instrument consisted of six parts which sought to measure: (a) technology current use, (b) technology beliefs, (c) technology skills, (d) technology intentions, (e) barriers to technology use, and (f) personal data. Technology current use was measured using ten questions that explored the extent to which technology was used in various education-related areas. Response categories ranged from 0 to >10 times in the last week (0; 1–5; 6–10; >10). Technology beliefs, technology skills, and technology intentions were measured using Likert-type scales consisting of 4 questions for each construct. Respondents were asked to indicate their level of agreement (SA – *strongly agree*, A – *agree*, D – *disagree*, or SD – *strongly disagree*) to each statement and responses scored (SA = 4, A = 3, D = 2, SD = 1). Barriers to technology use assessed the extent to which 19 possible constraints affected teachers' technology use at school. Respondents were asked to express their level of agreement on a 3-point scale and each response was scored (A – *agree* = 3, N – *neutral* = 2, or D – *disagree* = 1).

Personal data included: teachers' access to 12 technology software and tools at home, age, gender, level of education, experience in teaching, perception of computer literacy level, study of computer science as a subject, and intentions to continue a career in education.

The instrument was examined for content validity by colleagues at the University of the West Indies, the University of Trinidad and Tobago, and the University of Florida. After some changes, the instrument was pretested among six agriscience teachers in North Trinidad. Changes involved inclusion of additional barriers items, reconstruction of questions related to personal data, and replacement/rewording of some current technology items.

Data were collected over a 3-week period in October 2012, and analyzed used SPSS v 17. Results were presented as descriptive statistics, and ANOVA was used to explore relationships between personal factors and technology use in agriscience education.

Cronbach's alpha (α), the measure of reliability, was assessed for scales as follows: Technology current use (α = 0.87); technology beliefs (α =0.89); technology skills (α = 0.85); technology intentions (α = 0.88) and; barriers to technology use (α = 0.81).

Results

Table 1 shows the frequencies of the characteristics of the sampled population of agriscience teachers. The majority of the sample was female (56%), while 44% was male. Most respondents were between 30–39 years of age (29%); 28% were 40–49 years old; 27% were more than 50 years old; and others (16%) were even younger (20–29 years old). Almost half the sample completed a graduate degree (49%), while 41% held bachelor's degrees, and 10% possessed only diplomas. Most teachers (47%) never studied computer science as a subject, while 22% studied it at the tertiary level. Some (31%) of teachers had more than 20 years of experience; 28% had 11–20 years experience; 25% had 6–10 years of experience; and 16% had less than 5 years of experience. The majority of teachers intended to continue their career in the field of education (78%). Most teachers (42%) perceived their computer literacy level as moderate; the majority (70%) used computers more than 5 times weekly; 64% reported very easy access to computers at home, while 66% had somewhat easy access at school.

Table 1. Composition of the Sample of Agriscience Teacher (*n* = 77)

Variable	Response	Frequencies	Percent
Gender	Male	34	44
	Female	43	56
Age	20–29	12	15
	30–39	22	29
	40–49	22	29
	>50	21	27
What is the highest level of education you have completed?	Diploma	8	10
	Associate degree/Degree	31	41
	Graduate Degree	38	49
I studied computer science as a subject……	Never	36	47
	Yes, in secondary school	11	14
	Yes, at a diploma level	13	17

	Yes, at a tertiary level	17	22
Years of work experience in the field of education	0-5	12	16
	6–10	19	25
	11–20	22	28
	>20	24	31
Do you intend to continue your career in education?	Yes	61	78
	No	16	22
How do you rate your computer literacy level?	Very high	17	22
	High	22	28
	Moderate	32	42
	Low	6	8
I use a computer at home:	< 3 times weekly	14	18
	3-5 times weekly	10	12
	> 5 times weekly	53	70
Access to ICT equipment at home	No access	2	2
	Somewhat easy access	26	34
	Very easy access	49	64
Access to ICT equipment at school	No access	17	22
	Somewhat easy access	51	66
	Very easy access	9	12

Technology Current Use

Table 2 provides a summary of the current use of technology by agriscience teachers. Results show that weekly, teachers used technology more often to maintain personal contacts (38%, >10 times/week), for leisure purposes (38%, >10 times/week), and to enhance their own personal knowledge (29%, >10 times/week). Conversely, teachers used technology less often to send and retrieve assignments from students (74%, 0 times/week) and to assist with administrative tasks (51%, 0 times/week).

Table 2. Weekly ICT Usage by Agriscience Teachers (*n* = 77)

	Percentage of Teachers at Each Usage Level			
ICT Use	0 Times	1-5 Times	6-10 Times	>10 Times
Maintain personal contacts?	7	29	26	38
For leisure purposes/relaxation/unwind?	12	23	27	38
To enhance your personal knowledge?	4	32	35	29
Prepare teaching/training materials?	12	53	18	17
Search for information to prepare lesson plans/activities?	20	45	18	17
Acquire the knowledge you needed to enhance your training?	16	52	22	10
Store teaching materials?	24	44	17	15

Perform your personal tasks (online shopping, scheduling appointments etc?	36	25	25	14
Assist with your administrative tasks, communicating with your supervisors, colleagues, etc?	51	32	7	10
Send and retrieve assignments to/from students?	74	20	3	3

Technology Beliefs, Skill, and Intentions

Table 3 provides a summary description of teachers' technology beliefs, skills and intentions. Frequencies indicate that most teachers had strong beliefs in technology usefulness to accomplish tasks more quickly (M = 3.5; SD = .58); the use of technology enhances their quality of work (M = 3.5; SD = .53); that technology was easy to use for all tasks (M = 3.0; SD = .7); and that they intended to use technology more in their teaching sessions (M = 3.3; SD = .59).

Table 3. Technology Beliefs, Skill, and Intentions of Agriscience Teachers (n = 77)

	SA %	A %	D %	SD %	Mean (SD)
Technology Beliefs					
Using technology enables me to accomplish tasks more quickly	51	44	5	0	3.5 (.58)
Using technology enhances the quality of my work	55	44	1	0	3.5 (.53)
Using technology I am able to do much more work	47	43	10	0	3.4 (.68)
Using technology makes it easier to do my work	45	48	7	0	3.4 (.61)
Technology Skills					
I find it easy to use technology to do all my tasks	25	55	18	2	3.0 (.70)
I find it easy for me to become skillful in using technology	26	58	14	2	3.1 (.67)
I find it easy to use technology (hardware, software applications, etc...)	19	56	23	2	2.9 (.70)
Technology Intentions					
I intend to use technology more in teaching sessions with my students	33	59	8	0	3.3 (.59)
I intend to use technology more to get information out to my students	22	61	16	1	3.0 (.66)
I intend to use technology to communicate with my colleagues, prepare reports, etc….	22	68	10	0	3.1 (.56)
I intend to use technology more to keep in touch with my students	21	52	27	0	2.9 (.70)

Note. Data coded as SA = 4, A = 3, D = 2, and SD = 1.

Barriers to Technology Use

Results from Table 4 indicate that the major barriers to technology use by agriscience teachers in secondary schools were the limited access to key supporting devices (printers, scanners; M = 2.8; SD = .6), general shortages of computers (M = 2.8; SD = .6), the lack of a reward system to encourage technology use (M = 2.8; SD = .5), poor technical infrastructure (M = 2.8; SD = .4), and poor internet connections (M = 2.8; SD = .5). On the other hand, teachers

stated that the barriers with the least impact were the lack of interest by departmental colleagues in technology use (M = 1.9; SD = .8) and the unavailability of appropriate resources (M = 2.1; SD =.8).

Table 4. Barriers to Technology Use in Schools by Agriscience Teachers (n = 77)

Barriers	Agree %	Neutral %	Disagree %	Mean (*SD*)
There is limited access to media (printer, scanner etc.) for effective use of computers	86	6	8	2.8 (.6)
There is a shortage of computers for use by teachers	83	9	8	2.8 (.6)
There is no reward system in place to encourage technology use	78	21	1	2.8 (.5)
The existing technical infrastructure (wireless, access points) is poor	85	12	3	2.8 (.4)
Internet connection is usually unavailable, or poor	83	13	4	2.8 (.5)
There are insufficient financial resources for technology integration	74	23	3	2.7 (.5)
There is inadequate/inefficient instructional software/electronic resources	76	20	4	2.7 (.5)
There is an inefficiency/inadequacy of technical support when hardware/software problems arise	76	17	7	2.7 (.6)
Schools' computer laboratories are outdated/inefficient	66	26	8	2.6 (.6)
There is a shortage/lack of support services in instructional material development using modern technologies	67	21	12	2.6 (.7)
It is difficult to access the existing hardware (computer, projector etc.)	66	18	16	2.5 (.7)
The computers are outdated/slow and cannot do tasks required by teachers	60	32	8	2.5 (.6)
There is a lack of professional development opportunities for gaining knowledge and skill in technology use	57	26	17	2.4 (.8)
There is a lack of guidance and support by administration to develop teachers technological competencies	54	29	17	2.4 (.8)
There is insufficient time to prepare materials based on technology	58	24	18	2.4 (.8)
There are difficulties of improper teaching methods for technology usage	38	43	19	2.2 (.7)
Teachers lack the technical knowledge necessary to prepare materials based on technology	38	33	30	2.1 (.8)
There are little appropriate (useful information) resources available via technology	38	31	31	2.1 (.8)
There is a lack of interest by departmental colleagues in technology use	32	33	35	1.9 (.8)

Note. Data coded as agree = 3, neutral = 2, and disagree = 1.

Differences in Technology Current Use, Beliefs, Skills, and Intentions

Results (Table 4) indicate that there was a significant difference in *Technology Current Use* based on computer literacy levels (F = 5.78, p = .00). Tukey's b post hoc test revealed that persons with very high (M = 25.2; SD = 1.4) and high levels (M = 26.3; SD = 1.2) of computer literacy used computers more often than those with moderate (M = 21.1; SD = 1.0) to low (M = 17.3; SD = 2.3) levels of computer literacy.

There were significant differences in *Technology Beliefs* based on age, career intentions, and computer literacy. For age, there was a significant difference in technology beliefs (F = 2.93, p = .04) and Tukey's b post hoc test showed that persons older than 50 years (M = 12.8; SD = .44) believed that technology was less useful than younger teachers. There was also a significant difference in technology beliefs based on career intentions (F = 5.37, p = .02). Teachers who intended to remain in the field of education (M = 14.0; SD = .83) believed that technology was more useful than teachers who intend to leave the field. For computer literacy, those with lowest levels of literacy had lowest belief in the usefulness of technology.

There was a significant difference in perceived *Technology Skills* based on the variables age, experience, and career intentions. Based on age, (F = 4.00, p = .01), Tukey's b post hoc test indicated that teachers over the age of 50 (M = 8.0; SD = .39) believed that they were less skillful in using technology than younger persons. As regards years of experience (F = 4.02, p = .01), Tukey's b post hoc test showed that persons with more than 20 years experience (M = 8.0; SD = .36) believed they were less skilled in technology usage than others. For career intentions, results suggested that there was a significant difference in technology skills (F = 4.81, p = .03). Teachers who planned to stay in the field of education (M = 9.3; SD = .24) believed they were more skillful in technology use than those who intended to leave the field.

There were significant differences in *Technology Intentions* based on the factors age and computer literacy levels. Based on age (F = 3.03, p = .04), Tukey's b post hoc test showed that persons older than 50 years of age (M = 11.1; SD = .46) intended to use technology less than younger teachers. With respect to computer literacy levels (F = 4.80, p = .00), Tukey's b post hoc test showed that persons with low levels of computer literacy (M = 9.5; SD = .83) intended to use technology less than others with moderate to high levels of computer literacy.

Table 5. Differences in Technology Current Use, Beliefs, Skills, and Intentions of Agriscience Teachers (n = 77)

Independent Variables		N	Mean (*SD*)	F statistic	df	P-value	Effect Size
Dependent Variable: Technology Current Use							
Computer literacy	Very High	17	25.2 (1.4)	5.78	3	.00	.19
	High	22	26.3 (1.2)				
	Moderate	32	21.1 (1.0)				
	Low	6	17.2 (2.3)				
Dependent Variable: Technology Beliefs							
Age	20 - 29	12	14.2 (.58)	2.93	3	0.04	.11
	30 - 39	22	14.6 (.43)				
	40 - 49	22	13.5 (.43)				
	>50	21	12.8 (.44)				
Career Intentions	Yes	61	14.0 (.26)	5.37	1	0.02	.07
	No	16	12.7 (.51)				
Computer literacy	Very High	17	14.4 (.49)	2.65	3	0.05	.10
	High	22	13.9 (.43)				
	Moderate	32	13.7 (.36)				
	Low	6	11.7 (.83)				
Dependent Variable: Technology Skills							
Age	20 - 29	12	9.9 (.52)	4.00	3	0.01	.14
	30 - 39	22	9.6 (.38)				
	40 - 49	22	8.9 (.38)				
	>50	21	8.0 (.39)				
Experience	0 – 5 Years	12	9.8 (.52)	4.02	3	0.01	.14
	6 - 10 Years	19	9.4 (.41)				
	11 - 20 Years	22	9.4 (.38)				
	>20 Years	24	8.0 (.36)				
Career Intentions	Yes	61	9.3 (.24)	4.81	1	0.03	.06
	No	16	8.1 (.46)				
Dependent Variable: Technology Intentions							
Age	20 - 29	12	12.8 (.61)	3.03	3	0.04	.11
	30 - 39	22	12.9 (.45)				
	40 - 49	22	12.5 (.45)				
	>50	21	11.1 (.46)				
Computer literacy	Very High	17	13.1 (.49)	4.80	3	0.00	.17
	High	22	12.5 (.43)				
	Moderate	32	12.3 (.36)				
	Low	6	9.5 (.83)				

Conclusions, Implications, and Recommendations

Based on the data presented, several conclusions can be drawn. However, the small sample size and small effect sizes are limitations of the study. It would appear that agriscience teachers in Trinidad have accepted ICT as useful tools. Teachers used ICT most frequently for personal reasons and less frequently for school-related tasks, which was different than Rampersad's (2011) observations. ICT usage varied based on the self-described computer literacy of the teacher, likely an indicator of *perceived ease of use* (TAM2, Vankatesh & Davis, 2000). Agriscience teachers in Trinidad used ICT for a variety of tasks, with personal tasks ranking the highest. Tasks associated with job-related duties varied widely.

Agriscience teachers in Trinidad were not homogenous in their beliefs and skills related to ICT. Teachers generally believed that ICT helped them accomplish tasks more quickly, enhanced their quality of work, were easy to use, and could help in keeping in touch with their students. However, beliefs varied based on age, career intentions, and computer literacy. Agriscience teachers also agreed that they possessed moderate skill levels and intended to use ICT as a part of their jobs. But differences in perceived skills were noted based on age, experience, and career intentions. Differences in technology use intentions were observed for age and computer literacy levels. The variability in agriscience teachers beliefs, skills, and intentions is consistent with other types of teachers in Trinidad and Tobago (Beeput, 2012; Phillip, 2007).

Trinidad and Tobago agriscience teachers also expressed numerous barriers to ICT usage. Primary barriers centered on technical issues such as lack of hardware, technical infrastructure, and connectivity. Additionally, teachers believed that lack of a reward structure impeded technology usage. These identified barriers would be considered *external variables* (TAM2, Vankatesh & Davis, 2000) and would need to be addressed to give teachers the flexibility to adopt or not adopt ICT. The barriers expressed by agriscience teachers were similar to those expressed by other teachers in Trindiad and Tobago (Beeput, 2012; Khan, 2012).

These findings can be used to develop professional development programming for both preservice and inservice agriscience teachers in Trinidad and Tobago. Specifically, such programs should aim to help teachers learn about other pedagogical ways to use ICT. Perhaps teachers with advanced skills could share their techniques with other teachers. Additional programming could be developed to target specific sub-groups of teachers based on current skill level, especially for teachers with limited computer proficiency. The researchers would also support a continuous on-going professional development program, as suggested by Warner (2010).

Although not intended for generalization, this study may have implications for other Caribbean nations and other developing nations. If secondary agriscience education programs are to be a component of a larger human capacity development effort for the respective agricultural sectors, the technologies modeled in those programs should be examined.

Additionally, the knowledge, skills, and beliefs of the teachers in those programs should be examined. The results from Trinidad and Tobago may provide some insight to guide initial efforts in these nations.

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