Utilizing Facebook to Disseminate Horticultural Lessons to Adults

Robert Strong
Assistant Professor
Agricultural Leadership, Education, and Communication
Texas A&M University
College Station, TX. 77843
r-strong@tamu.edu

Samantha Alvis
Graduate Assistant
Agricultural Leadership, Education, and Communication
Texas A&M University
College Station, TX. 77843
salvis@aged.tamu.edu

Type of research: **Quantitative**

Research Priority Area: **Extension Education**

Utilizing Facebook to Disseminate Horticultural Lessons to Adults

Abstract

Social media has an impact on how many Americans go about their daily lives. Over 800 million people have Facebook accounts and 50% of users log into the site each day. Facebook has been used in formal education environments to supplement traditional delivery methods and improve learning. Agricultural education researchers have studied the use of Facebook as a part of formal coursework. A quantitative content analysis was implemented for one year on the [State] Master Gardener Facebook page in order to analyze the educational lessons, formats of the lessons, and clientele questions. Eighty-one lessons were disseminated, landscaping (n = 21) was the most delivered subject, (n = 46) lessons were linked to websites, and information on landscaping received the most questions from clients (n= 62). Videos, websites, and fact sheets were included on the Facebook page as examples of where constituents could acquire more information on the topic. Given the amount of time adults spend on Facebook, the social media tool provides an important opportunity to provide information to more clients and at a relatively low cost. Future research should assist Master Gardener coordinators in developing a better understanding of approaches to enhance participant learning with social media. Other Extension programs may expand clientele by offering information on social media that can be accessed by adults via smartphones or tablet devices anytime, anyplace, and at their convenience. State Master Gardener programs should consider offering a Facebook page in order to improve educational communications and collaborations with participants, offer clientele valuable learning experiences, and expand the reach of the program's products with other adults.

Introduction

The demand for instantly accessible information has grown rapidly along with the development and advancement of technology. Social media tools have a profound impact on how adults conduct business (Robin, 2008). Facebook is a social media tool that increases social capital by developing new contacts with the intent of sharing information (Burgess, 2009). Roblyer et al. (2010) noted that Facebook was a valuable resource to improve educational communications and collaborations. Facebook currently has more than 500 million active users, with over 50% of those users logging in on a daily basis (Van Grove, 2010). Idris and Wang (2009) reported Facebook supported innovative learning methods, cultivated student engagement, encouraged use of current multimedia materials, and facilitated student reflection in a study of course content delivered by Web 2.0 tools (Idris & Wang, 2009). Facebook has the ability to displace other Virtual Learning Environments (VLE) through continued program development (Severence, Hardin, & Whyte, 2008).

Facebook has been used to supplement and enhance learning in educational environments. Baran (2010) found that 84% of students enrolled in a distance education course believed that Facebook could be used for "knowledge-sharing in formal education contexts" (p. 2) and that being able to communicate with their peers enrolled in the class helped to trigger their learning. In a study of Facebook use as communication and learning tool for a teaching cohort, English and Duncan-Howell (2008) reported that students found the group to be useful for "encouragement and support" (p. 600), by building a sense of community amongst the group, although students were based at different locations.

The use of Facebook on mobile devices is an intriguing and increasingly common trend within university systems. Oregon State University uses Facebook to deliver horticultural information to a variety of learners from diverse locations, including learners living abroad (Langellotto-Rhodaback, 2010). In Minnesota, participants of online Master Gardener courses spent 22% more time on course work than traditional classroom participants and found the use of online discussion lists a "valuable learning experience" (Jeannette & Meyer, 2002, p. 155).

The Master Gardner program is a major educational initiative of Cooperative Extension. Master Gardeners are individuals taught and trained by Extension faculty to deliver horticultural information to local constituents (Meyer et al., 2010). Approximately 3,900 [State] Master Gardeners taught approximately 65,000 of the [State's] 18 million citizens in 2009. Strong and Harder (2010) suggested Master Gardener coordinators may benefit from innovative delivery strategies designed to deliver educational programs to a broader group of stakeholders. Extension should expand their audience by providing unique delivery methods to targeted clientele (Loibl, Diekman, & Batte, 2010). Facebook is an innovative educational delivery tool that may expand Extension's clientele.

Agricultural education academics have conducted research on students' use of Facebook. Rhoades, Irani, Telg, and Myers (2008) reported approximately 85% of college of agriculture students at the University of Florida had a Facebook account. Roberts, Murphy, and Edgar (2010) utilized Facebook to assess Texas A&M University student teachers during their student teaching experience. In a study of agricultural education students' selected social media, Rucker, Naile, and Ray (2010) recommended instructors integrate social media into course curricula for the opportunity to improve student learning. However, little research exists on the use of Facebook to disseminate agricultural education information to adults outside the classroom. This study was conducted to address the *National Research Agenda's* recommendation that research is needed to examine appropriate delivery systems for nonformal agricultural extension audiences (Osborne, n. d.).

Theoretical Framework

This study was framed by Gagné's (1985) conditions of learning theory. Gagné (1985) identified nine techniques for designing instructional strategies to be an effective educator. The nine conditions of learning perspective are often referred to as conditions of learning or principles of cognitive learning. Educators should learn methods to enhance participant learning (Gagné, 1985). Merrill (2002) said the nine learning principles center on developing the learner's capacity and skills to acquire information at a more rapid pace.

An educator should gain the attention of the learner at the beginning (Gagné, 1985). This principle informs the learner regarding the topic that will be covered. The second step is to inform the participant of the learning objectives. This condition motivates the learner to focus on the lesson's expectations and the material that will be included. Stimulating recall of prior learning allows the learner to bridge personal experiences with new knowledge. An educator should provide stimuli to emphasize active learning methods that assist the learner in retaining new knowledge and promoting critical thinking and problem solving. Including discussions and interactive information in collaborative learning environments fosters learning guidance from the

educator. An educator should elicit performance to examine whether the learner has acquired the respective competency. This feature motivates the learner to be more self-directed. Providing feedback aids the educator in determining whether the learning objective can be consistently executed. An educator should assess the performance of learners routinely in an informal manner. Creating experiences that enable adults to generalize the information to their personal situation is vital for educators (Gagné, 1985). This will increase the likelihood learners will transfer the information to their current lifestyle.

Gagné's (1985) nine conditions of learning have been used in a variety of studies involving technology instructional environments. Studies have utilized the nine conditions of learning to assess the design and development of educational technology programs in other countries (Fresen, 2007; Liu, 2008). The nine conditions of learning were used to measure instructional immediacy and design in web-based courses (Hutchins, 2003; Koohang & du Plessis, 2004)). Gagné's (1985) Studies have used the nine conditions of learning to evaluate student learning in web-based educational programs (Janicki & Liegle, 2001; Kidney & Puckett, 2003). The nine conditions of learning were utilized as the theoretical framework to measure the design quality and participant learning in technology based courses (Duebel, 2000; Moallem, 2001). Dooley, Lindner, and Dooley (2005) suggested the nine conditions of learning are effective methods for distance educators to plan instructional delivery.

Purpose and Objectives

The purpose of this study was to examine if the [State] Master Gardener Facebook page could be utilized as a nonformal education delivery system. More specifically, the study sought to:

1. Describe the topics and number of lessons on the Facebook page,

2. Describe the delivery method and number of responses of each educational lesson and;

3. Determine if the nine conditions of learning were in the horticultural lessons.

Methodology

The [State] Master Gardener Facebook page was examined from November 3, 2009, the public release date, to June 3, 2011 through the implementation of a quantitative content analysis to address the research objectives. A quantitative content analysis allows a researcher to systematically quantify data and is valuable in analyzing observational data (Riffe, Lacy, & Fico, 2005). This type of analysis enables the researcher to formulate themes that assist in understanding categories for large amounts of data (Fraenkel & Wallen, 2009). There are four advantages of content analysis in social science research. The major advantage of content analysis is the method is not obtrusive. Information can be assessed without the author or publisher being aware of the analysis (Fraenkel & Wallen, 2009). The second advantage of quantitative content analysis is the method provides a means of analyzing observational data (Riffe et al., 2005). Data can be in a newspaper, on television, or on a web site. The third advantage allows the researcher to sift through documents and records in order to gain an understanding of the social phenomena. The fourth advantage of a quantitative content analysis is time. Information that is readily available does not require a great deal of time and money to

analyze (Fraenkel & Wallen, 2009). A commonly used approach to interpret data in a quantitative content analysis is to calculate frequencies and the proportion of specific amounts compared to whole amounts (Riffe et al., 2005).

A quantitative content analysis has techniques to address validity and reliability for social science research. Face and construct validity of the study were assessed by a team of horticultural researchers and educators at [State] University. Valid constructs enable researchers to apply theory to a quantitative content analysis (Riffe et al., 2005). In this study, coders were used to identify the groupings in order to assist in addressing reliability and apply those definitions to the content being analyzed, as recommended by Riffe et al. (2005). Gagne's (1985) nine conditions of learning were used by the researchers to create defined groupings used to address reliability in this study. The nine conditions of learning were the groupings used to address reliability.

Intercoder reliability is the degree independent coders assess the characteristic of a message and make identical conclusions (Fraenkel & Wallen, 2009). Riffe et al. (2005) indicated addressing intercoder reliability is a critical facet of content analysis. The researchers measured intercoder reliability of the topics on the [State] Master Gardener Facebook page through the implementation of Cohen's kappa (k). Agresti and Finlay (2009) recommended Cohen's kappa as the most robust approach to assess intercoder reliability. Cohen's kappa is calculated as $k = \Pr(a) - \Pr(e) \div 1 - \Pr(e)$. $\Pr(a)$ is the comparative observed agreement between raters. The hypothetical probability of chance agreement is $\Pr(e)$. When raters are in complete agreement, then $k = 1$, and when no agreement exists, then $k = 0$ (Cohen, 1968). The researchers used SPSS 18.0™ to calculate the Cohen's kappa in order to answer the study's third objective: to examine if the horticultural lessons contained the nine conditions of learning. Each of Gagné's (1985) nine conditions of learning was calculated, using Cohen's kappa, with the ten horticultural topics found on the [State] Master Gardener page (see Table 1). According to Cohen (1968) when implementing Cohen's kappa, coefficients of .80 or greater are acceptable in research. The researchers organized results from the study into topics, educational lessons, format of each educational lesson, and the number of questions received from clientele based on the topic.

Table 1
Reliability of the Nine Events of Learning between the Horticultural Topics on Facebook

Condition of Learning	***k***
Gain attention	.96
Informing learner of the learning objective	.92
Stimulating recall of prior learning	.88
Provide stimuli to emphasize active learning methods	.86
Learning guidance from the educator	.83
Elicit performance	.83
Provide feedback	.81
Assess performance	.76
Generalize	.72

Note: Reliability coefficient of .80 or higher were considered acceptable (Cohen, 1968).

Findings

Findings were organized by the topic, educational lessons, formats of the lessons, and the number of clientele questions per topic within that topic over a twenty month period. The limitations of the study were the target population and delivery tool. The results should not be generalized to all Master Gardener programs or other nonformal educational programs on Facebook. The first objective of the study was to examine the number of educational lessons and describe the topics on the Master Gardener Facebook page (see Table 2). A total of 81 different lessons were delivered on Facebook. A variety of horticultural educational topics were delivered on Facebook. Landscaping (n = 21), Insects (n = 12), and newsletters (n = 12) were the most delivered topics. Newsletters were a topic created by the researchers and were delivered monthly on the Facebook page. Safety (n = 3) was the least delivered topic on the [State] Master Gardener Facebook page.

Table 2
Distribution of Topics and Numbers of [State] Master Gardener Facebook Lessons

Topic	**Lessons (*f*)**	**Percentage of Sample**
Landscaping	21	25.9%
Insects	12	14.8%
Newsletters	12	14.8%
Flowers	9	11.1%
Vegetables	6	6.2%
Fruits	5	6.1%
Plants	5	6.1%
Soil	4	4.9%
Animals	4	4.9%
Safety	3	3.7%

Note: The topics and quantities were examined from November 3, 2009 to June 3, 2011.

The study's second objective was to describe the delivery method and number of responses of each identified educational lesson on Facebook (see Table 3). There were (n = 46) Master Gardener lessons linked to websites, (n = 51) lessons were informational fact sheets, and (n = 6) lessons provided video demonstrations. Landscaping (n = 62) and insects (n = 54) received the most questions from clientele. The State Master Gardener Coordinator's office responded to each of the questions submitted on the Facebook page.

Table 3
Topics, Delivery Method and Number of Questions for Master Gardener Facebook Lessons

	Method of Delivery (*f*)			Responses(*f*)
Topic	**Video**	**Website**	**Text**	**Questions**
Landscaping	5	11	8	62
Insects	1	11	14	54
Newsletters	0	1	12	35
Flowers	0	5	5	35
Fruits	0	3	2	27
Vegetables	0	3	3	20
Plants	0	5	1	14
Soils	0	4	1	16
Animals	0	2	3	26
Safety	0	1	2	9

Note: The lessons were examined from November 3, 2009 to June 3, 2011.

The third objective of the study was to examine if the horticultural lessons contained Gagné's (1985) nine conditions of learning (see Table 4). Each lesson incorporated at least one of the nine conditions of learning. All lessons ($N = 81$) gained the participant's attention and informed the participant of the learning objective. Very few ($n = 3$, 3.70%) of the 81 educational lessons provided feedback, assessed the performance of participants, or generalized the information to their lives.

Table 4
Examining the Horticultural Lessons with the Nine Conditions of Learning (N = 81)

Conditions of Learning	***f***	**%**
Gain Attention	81	100
Informing learner of the learning objective	81	100
Stimulating recall of prior learning	52	64.1
Provide stimuli to emphasize active learning methods	49	60.4
Learning guidance from the educator	32	39.5
Elicit performance	30	37.1
Provide feedback	3	3.7
Assess performance	3	3.7
Generalize	3	3.7

Note: The lessons were examined from November 3, 2009 to June 3, 2011.

Conclusions/Implications/Recommendations

Landscaping was the most popular topic on Facebook. Insects were also commonly discussed on the [State] Master Gardeners program page on Facebook. A variety of both beneficial and harmful insects were described. The Safety category included lessons on heat safety and the Gulf of Mexico oil spill. Safety is not typically considered a horticultural topic. The majority of educational lessons did not include the nine conditions of learning. Facebook administrators did utilize videos, websites, and fact sheets as examples where constituents could acquire more information on the topic. Facebook was used as an outlet to deliver *The Neighborhood Gardener*, the monthly [State] Master Gardeners newsletter.

Selected topics were delivered with the time of year in mind, as Gagné (1985) recommends. The Master Gardener lessons on Facebook gained the attention (Gagné, 1985) of friends of the page because each lesson was related to the growing season or a current environmental concern. Not all lessons informed participants of the learning objective. Including a learning objective encourages a student to concentrate on the material that will be covered (Gagné, 1985). Each lesson did not connect a client's personal experiences with new horticultural knowledge. Gagné's (1985) research indicated stimulating a memory of past learning allows the learner to channel personal experiences with new information.

The comments sections provided clients with a collaborative learning environment to communicate with one another and the coordinator. Gagné (1985) said incorporating discussions in cooperative learning environments cultivates learning guidance from the instructor. The lessons on the Facebook page did not include an evaluation component to measure if friends had learned new information or changed their current practice as a result of participating in the Master Gardener lessons on Facebook. Gagné (1985) said educators should measure student's performance to develop an understanding of the competencies acquired. The coordinator cannot be sure which client and how many viewers gained knowledge to further develop the capacity and skills to learn information more effectively. An instructor should evaluate the accomplishments of students regularly (Gagné, 1985). The Facebook Master Gardener lessons constructed opportunities and experiences, through websites, fact sheets, and videos that enabled clientele to generalize the content. This aspect enhanced the likelihood clientele transferred the Facebook information to their current gardening situation (Gagné, 1985).

The results presented here add to the current literature and offer practitioners techniques to broaden the reach of Extension's educational efforts. Facebook was found to deliver educational content to constituents. Information on Facebook can be accessed by smartphones or tablet devices and not solely through desktop computers. Delivering educational content on Facebook to a target audience was an innovative educational approach to offer specific information to adults at their convenience. Other Extension programs could offer information on Facebook, Twitter, or other social media platforms accessed conveniently by adults via smartphones or tablet devices at any time or place.

Future research should assist Master Gardener coordinators in developing a better understanding of approaches to enhance participant learning with social media. This study framed the research around Gagné's (1985) nine conditions of learning. Bloom's (1956) taxonomy of learning domains would be another theoretical approach to assist Master Gardener coordinators better

comprehend how to improve participant learning through educational content on Facebook. Incorporating Blumler and Katz's (1974) uses and gratifications theory could assist in identifying whether the Master Gardener Facebook page to fulfills client's needs.

Master Gardener coordinators should include all nine of Gagné's (1985) conditions in horticultural educational lessons on Facebook in order to increase the likelihood that maximum learning outcomes will be produced. Professional development efforts from Extension Systems can improve program coordinators' knowledge and skills of approaches to improve clientele learning. Teaching Master Gardener coordinators the nine conditions of learning, the taxonomy of learning, and the fundamentals of uses and gratifications could be achieved through face-to-face instruction, web-based learning modules, or videoconferencing systems.

Given the amount of time adults spend on Facebook (Van Grove, 2010); the social media tool provides an important opportunity to provide information to more clients and at a relatively low cost. Including newsletters on a Facebook page decreases the costs associated with printing and mailing newsletters to participants. Due to the relative ease of creating a Facebook page with educational content and given the current state of financial budgets, Master Gardener and Extension programs should examine offering newsletters on Facebook as an approach to decrease costs and expand viewership.

In this study, not all clientele of the [State] Master Gardener Facebook page were certified Master Gardeners. This indicates the goals and educational information of Master Gardener can be expanded to larger audiences outside of program coordinators, volunteer educators, and clientele. Other state Master Gardener programs should consider offering a Facebook page in order to improve educational communications and collaborations (Roblyer et al., 2010) with participants, offer clientele valuable learning experiences (Jeannette & Meyer, 2002), and expand the reach of the program's products with other adults, as recommended by Strong and Harder (2010).

References

Agresti, A., & Finaly, B. (2009). *Statistical methods for the social sciences* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

Baran, B. (2010). Facebook as a formal instructional environment. *British Journal of Educational Technology*, 41(6):E146-E149.

Bloom, B. S. (1956). *Taxonomy of educational objectives, handbook i: The cognitive domain*. David McKay Co., New York

Blumler, J. G., & Katz, E. (1974). The uses of mass communications: Current perspectives on gratifications research. Beverly Hills, CA: Sage.

Burgess, K. R. (2009). Social networking technologies as vehicles of support for women in learning communities. *New Directions for Adult and Continuing Education, 122*, 63-71.

Cohen, J. (1968). Weighted kappa: Nominal scale agreement with provision for scaled disagreement or partial credit. *Psychological Bulletin, 70*, 213-220.

Dooley, K. E., Lindner, J. R., & Dooley, L. M. (2005). *Advanced methods in distance education: Applications and practices for educators, administrators and learners*. Information Science Publishing, Hershey, PA

Deubel, P. (2000). An investigation of behaviorist and cognitive approaches to instructional multimedia design. *Journal of Educational Multimedia and Hypermedia*, *12*(1), 63-90.

English, R., & Duncan-Howell, J. (2008). Facebook goes to college: using social networking tools to support students undertaking teaching practicum. *MERLOT Journal of Online Learning and Teaching*, 4(4): 596-601.

Fraenkel, J. R., & Wallen, N. E. (2009). *How to design and evaluate research in education (7th ed.)*. McGraw-Hill, New York.

Fresen, J. W. (2007). A taxonomy of factors to promote quality web-supported learning. *International Journal of E-Learning*, *6*(3), 351-362.

Gagne, R. M. (1985). *The conditions of learning (4th ed.)*. Holt, Rinehart & Winston, New York.

Hutchins, H. M. (2003). Instructional immediacy and the seven principles: Strategies for facilitating online courses. *Online Journal of Distance Learning Administration, 6*(3): 1-11.

Idris, Y., & Wang, Q. (2009). Affordances of Facebook for learning. *International Journal of Continuing Engineering Education and Life Long Learning*, *19*(2-3), 247-255.

Janicki, T., & Liegle, J. O. (2001). Development and evaluation of a framework for creating web-based learning modules: A pedagogical and systems perspective. *Journal of Asynchronous Learning Networks, 5*(1): 58-84.

Jeannette, K. J., & Meyer, M. H. (2002). Online learning equals traditional classroom training for Master Gardeners. *Horttechnology, 12*(1), 148-156.

Kidney, G. W., & Puckett, E. G. (2003). Rediscovering first principles through online learning. *The Quarterly Review of Distance Education, 4*(3), 203-212.

Koohang, A., & du Plessis, J. (2004). Architecting usability properties in the e-learning instructional design process. *International Journal of E-Learning, 3*(3), 38-44.

Langellotto-Rhodaback, G. A. (2010). Enrollment, retention and activity in an online Master Gardener course. *Journal of Extension*, *48*(4).Retrieved from, http://www.joe.org/joe/2010august/rb3.php

Liu, G. Z. (2008). Innovating research topics in learning technology: Where are the new blue oceans? *British Journal of Educational Technology, 39*(4), 738-747.

Loibl, C., Diekmanand, F., & Batte, M. T. (2010). Does the general public know the Extension service? A survey of Ohio residents. *Journal of Extension, 48*(2). Retrieved from, http://www.joe.org/joe/2010april/rb3.php

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development, 50*(3), 43-59.

Meyer, M. H., Burrows, R., Jeanette, K., Welty, C., & Boyson, A. R. (2010). Master Gardener's confidence and use of integrated pest management. *Horttechnology, 20*(4), 812-816.

Moallem, M. (2001). Applying constructivist and objectivist learning theories in the design of a web-based course: Implications for practice. *Educational Technology and Society, 4*(3): 113-125.

Osborne, E. W. (Ed.) (n.d.). *National research agenda: Agricultural education and communication, 2007-2010.* Gainesville, FL: University of Florida, Department of Agricultural Education and Communication.

Rhoades, E. B., Irani, T., Telg, R., & Myers, B. E. (2008). Internet as an information source: Attitudes and usage of students enrolled in a College of Agriculture course. *Journal of Agricultural Education, 49*(2), 108-117. doi: 10.5032/jae.2008.02108

Riffe, D., Lacy, S., & Fico, F. G. (2005). *Analyzing media messages: Using quantitative content analysis in research (2nd ed.).* Lawrence Erlbaum Associates, Mahwah, NJ

Roberts, T. G., Murphy, T. H., & Edgar, D. W. (2010). Exploring interaction between student teachers during the student teaching experience. *Journal of Agricultural Education, 51*(1), 113-125. doi: 10.532/jae.2010.01113

Robin, B. R. (2008). Digital storytelling: A powerful technology tool for the 21st century classroom. *Theory Into Practice, 47*, 220-228.

Roblyer, M. D., McDaniel, M., Webb, M., Herman, J., & Witty, J. V. (2010). Findings on Facebook in higher education: A comparison of college faculty and student uses and perceptions of social networking sites. *The Internet and Higher Education, 13*(3), 134 140.

Rucker, K. J., Naile, T. L., & Ray, B. K. (2010). *Students of tomorrow: Agricultural students' use of selected social media*. Proceedings of the 108th Southern Association of Agricultural Scientists Conference. Corpus Christi, TX. Retrieved from, http://agnews.tamu.edu/saas/2010/naile.pdf

Severance, C., Hardin, J., & Whyte, A. (2010). The coming functionality mash-up inpersonal learning environments. *Interactive Learning Environments, 16*(1), 47-62.

Strong, R., & Harder, A. (2010). Motivational orientations of adults participating in a Coopertative Extension Master Gardener program. *Journal of Extension, 48*(4). Retrieved from, http://www.joe.org/joe/2010august/rb2.php

Van Grove, J. (2010). More than 250 million people use Facebook on a daily basis. *Mashable/Social Media*. Retrieved from, http://mashable.com/2010/11/16/facebook social/