Journal of Extension

Volume 55 | Number 1 Article 13

2-1-2017

Assessment of an Online Nematology Training for County Extension Agents

Mia Gentry
University of Arkansas

Leslie D. Edgar
University of Arkansas

Donna L. Graham
University of Arkansas

Terry Kirkpatrick
University of Arkansas

Recommended Citation
Gentry, M., Edgar, L. D., Graham, D. L., & Kirkpatrick, T. (2017). Assessment of an Online Nematology Training for County Extension Agents. *Journal of Extension, 55*(1), Article 13.
https://tigerprints.clemson.edu/joe/vol55/iss1/13

This Research in Brief is brought to you for free and open access by TigerPrints. It has been accepted for inclusion in Journal of Extension by an authorized editor of TigerPrints. For more information, please contact kokeefe@clemson.edu.

Journal of Extension
www.joe.org

February 2017
Volume 55
Number 1
Article # 1RIB7
Research In Brief

Assessment of an Online Nematology Training for County Extension Agents

Abstract

A set of online nematology modules was administered to county Extension employees for the purpose of assessing its efficacy as a training tool on the basis of participants' changes in knowledge and evaluative feedback. Mean pretest and posttest scores indicated increases in participants' levels of nematology knowledge and comfort with nematology topics. Participants found using the modules to be an effective method of learning. We recommend that other online training modules be developed and that future research involve testing the materials in a controlled setting so that a determination can be made as to whether the knowledge change was due to the treatments or external factors.

Mia Gentry
Former Graduate Assistant
University of Arkansas
Fayetteville, Arkansas

Leslie D. Edgar
Professor and Assistant Dean, Dale Bumpers College of Agricultural, Food, and Life Sciences
University of Arkansas
Fayetteville, Arkansas
ledgar@uark.edu

Donna L. Graham
Professor of Extension Education
Agricultural Education, Communications, and Technology Department
University of Arkansas
Fayetteville, Arkansas
dgraham@uark.edu

Terry Kirkpatrick
Professor of Plant Pathology
University of Arkansas Division of Agriculture
Fayetteville, Arkansas
kirkpatr@uark.edu

Introduction

Extension agents play a valuable role in the dissemination of research-based information and educational materials needed by many audiences, including agricultural producers. Agents generally attend in-service training to receive instruction in subject matter areas to remain current in subjects and techniques pertinent to their jobs (Seevers & Graham, 2012). Recent innovations in Extension agent training and education include e-learning. Research has shown that Internet-based training for Extension agents is effective and that many agents are open to this method of training (Lippert, Plank, & Radhakrishna, 2000; McCann, 2007). However, multiple barriers, such as time, money, and training, constrain Extension professionals from adopting new technology and innovations (Diem, Hino, Martin, & Meisenbach, 2011).

One of the many areas in which training is needed in Arkansas is agronomic crop production. Soybean and cotton production make significant contributions in the state (University of Arkansas Division of Agriculture, 2012), but crop losses caused by plant diseases have a significant impact on yield. Nematodes are a major concern for cotton and soybean producers, causing $33 billion in crop loss in the United States (Pimentel, 2010). These plant-parasitic nematodes are estimated to account for "at least 90% of crop losses" in Arkansas annually (Kirkpatrick & Thomas, n.d., p. 2).

Due to the significant impacts of plant-parasitic nematodes, leading researchers in the field of plant pathology identified a great need to expand the knowledge base in plant and soil nematology and to increase research, education, and outreach in nematology (Barker et al., 1994). With limited resources for helping county agents stay up-to-date about nematodes, Extension must explore new technologies for training agents on the topic.

Our study was guided by the ADDIE model of instructional design for online learning (Allen, 2006; Shelton & Saltsman, 2007). The ADDIE model promotes the use of analyzing, designing, developing, implementing, and evaluating phases in the instructional design process (Allen, 2006). The analysis phase of ADDIE requires instructional designers to analyze the need for training and to compare that need with the "skills, knowledge, and abilities" of the targeted learners (Allen, 2006, p. 436). Previous research involved a needs assessment for determining knowledge, competencies, and skills of the target audience (Gentry, Edgar, Graham, & Kirkpatrick, 2017). The ADDIE model was deemed the most appropriate model to follow because it involves analysis of the materials needed for the intended instruction. As a result of such analysis, the instruction is designed, developed, and implemented in the way that is most usable and practical with regard to enabling the target audience to understand the content of the training. Last, an evaluation of the training materials occurs, and modifications that are necessary for increasing audience understanding are made (Allen, 2006). Evaluation is an important component of Extension training development, especially training provided through electronic dissemination, and should be used to improve electronic training materials.

Objectives

This article focuses on the second phase of a study addressing an online nematology training developed for Extension agents and crop consultants. The following objectives guided the study:

- Assess the usability of an online nematology educational training on the basis of changes in knowledge among Arkansas agricultural county Extension agents and research support staff.
- Assess the usability of an online nematology educational training on the basis of evaluative feedback from Arkansas agricultural county Extension agents and research support staff.

Methods

The population for the study was agricultural county Extension agents and research support staff in the Arkansas Delta district. The research was approved by the University of Arkansas's institutional review board.

The training consisted of three modules addressing nematology topics. The modules covered basic introductory information about plant-parasitic nematodes, signs and symptoms of plant diseases, and soil sampling for plant-parasitic nematodes. Each module comprised a short lesson and a quiz. All modules were designed in Articulate Storyline, software used for authoring interactive e-learning content. All content was based on research findings and information from peer-reviewed journals, Extension fact sheets, and publications containing Extension recommendations. The training was administered as an asynchronous, self-guided e-learning course. All materials were made available on the University of Arkansas Cooperative Extension Service in-service training site. The in-service training site is powered by Moodle, an e-learning management system (Moodle.org, 2013).

© 2016 Extension Journal Inc

A one-group pretest/posttest design was used for the study (Campbell & Stanley, 1963), with data collected at multiple points during the study. The pretest was for assessing respondents' nematology knowledge prior to completion of the modules. The pretest collectively consisted of quiz questions taken from each module and was administered in its entirety prior to participants' attempting the modules. Participants were not provided with feedback regarding their correct and incorrect answers on the pretest. Data for questions not included in both the pretest and posttest were omitted from the data analysis. For each module, respondents were required to complete the lesson and then complete the corresponding posttest (lesson quiz) to demonstrate any knowledge change resulting from completion of the lesson. In addition to the pretest/posttest questions, a pretraining questionnaire was administered. The questionnaire consisted of demographic questions and Likert-type scaled questions. And, finally, a posttraining questionnaire was administered after completion of all three modules for the purpose of discovering participants' perceptions of the modules. Participants potentially could have completed all aspects of the training in less than 2.5 hr.

Analysis of data included identifying descriptive statistics and performing paired-samples *t*-tests. We analyzed responses from Likert-type scaled questions by calculating the median and mode to measure central tendency. We measured variability by calculating frequencies. Because Likert-type scaled questions are ordinal in nature, the most appropriate analyses were median, mode, and frequencies (Boone & Boone, 2012). We analyzed pretest and posttest responses using paired-samples *t*-tests to determine whether there was a significant difference in participants' knowledge levels before and after taking part in the training.

Findings

As mentioned, demographic information was collected through the use of a pretraining questionnaire (N = 33). Among the participants in the study, 33% (n = 11) were county agents, 33% (n = 11) were county agents with county staff chair responsibilities, 21% (n = 7) were program associates, and 12% (n = 4) were program technicians. A majority of participants (82%, n = 27) were male. Most participants (73%, n = 24) had a master's degree, 27% (n = 9) had a bachelor's degree, and 4% had completed some graduate coursework. Participants 46 to 55 years old represented the largest age group (37%, n = 12). Taken together, those aged 18 to 33 and 34 to 45 made up the next largest age group (22%, n = 7), and those aged 56 to 64 made up 19% of the participants (n = 6).

With regard to study objective 1, we used data from the pretests and posttests to assess participants' changes in knowledge (Table 1). The average overall pretest score was 84.97 (SD = 11.55), and the average overall posttest score was 94.39 (SD = 6.07). We performed a matched paired *t*-test to determine whether the difference in mean test scores was significant. Test statistics from the analysis showed a significant difference between the overall pretest score and overall posttest score (t[28] = 5.18, p = <.001).

Table 1.

Paired-Samples *t*-Test Results from Study Pretest and Posttest Scores

Test	No.	*M*	*SD*	*t*	*p*
Module 1 pretest	29	89.65	14.32		
				2.43	.02*
Module 1 posttest	29	95.63	5.43		

© 2016 Extension Journal Inc

Module 2 pretest	29	88.36	19.46		
				2.91	<.01*
Module 2 posttest	29	99.14	4.64		
Module 3 pretest	29	80.00	16.69		
				5.53	<.001*
Module 3 posttest	29	95.17	11.22		
Overall pretest	33	84.97	11.55		
				5.18	<.001*
Overall posttest	29	94.39	6.07		

*p < .05 level.

With regard to study objective 2, we used data from the pretraining and posttraining questionnaires to assess changes in participants' levels of comfort with nematology topics and to identify participants' perceptions of the effectiveness of the training.

According to their responses on the pretraining questionnaire, before participating in the training, participants were "comfortable" with the majority of nematology topics identified (Table 2). A majority of respondents indicated prior to instruction that they were "very comfortable" (median of 4, mode of 5) collecting soil samples for nematodes (Table 2).

Table 2.

Respondents' Comfort Levels with Nematology Topics Before Instruction

				Likert-type scale frequencies				
Item	**No.**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
Assisting Extension clients with general nematology topics	33	4	4	2	5	6	15	5
Properly collecting soil samples for nematode detection	33	4	5	1	4	7	8	13
Using a web-based tutorial for learning in general	33	4	4	2	1	6	17	7
Using a web-based tutorial for learning about nematology	33	4	4	1	2	6	16	8

Note. Likert-type scale: 1 = *very uncomfortable*, 2 = *uncomfortable*, 3 = *neutral*, 4 = *comfortable*, 5 = *very comfortable*.

© 2016 Extension Journal Inc

After instruction, participants were asked to indicate their comfort levels with the same nematology topics that had been presented in the pretraining questionnaire. Participants indicated that they were "very comfortable" with the majority of nematology topics listed (Table 3). Overall, however, participants rated their comfort level with assisting Extension clients with general nematology topics as "comfortable" (Table 3).

Table 3.

Respondents' Comfort Levels with Nematology Topics After Instruction

				Likert-type scale frequencies				
Item	**No.**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
Assisting Extension clients with general nematology topics	27	4	4	1	0	2	14	10
Properly collecting soil samples for nematode detection	27	5	5	1	0	1	5	20
Using a web-based tutorial for learning in general	27	5	5	1	0	3	5	18
Using a web-based tutorial for learning about nematology topics	27	5	5	2	0	0	11	14

Note. Likert-type scale: 1 = *very uncomfortable*, 2 = *uncomfortable*, 3 = *neutral*, 4 = *comfortable*, 5 = *very comfortable*.

Participants also were asked to indicate their perceptions of the effectiveness of the online nematology modules (see Table 4). Most participants strongly agreed that the modules were effective. When asked whether the training was as effective for learning as traditional face-to-face classes, most participants agreed that it was (median = 4, mode = 4). Participants also were asked to rate their agreement with the statement "I feel comfortable using this web-based tutorial as a way of learning." Overall, participants expressed strong agreement with the statement (median = 5, mode = 5). For a majority (52%) of participants who completed the posttraining questionnaire, the online nematology training was the first web-based tutorial they had ever completed. All the first-time users responded on the posttest questionnaire that they planned to use web-based learning tools again.

Table 4.

Respondents' Perceptions of Usability of Online Educational Nematology Modules After Instruction

				Likert-type scale frequencies				
Item	**No.**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
I found this tutorial to be an effective method of presenting	27	5	5	0	0	0	13	14

© 2016 Extension Journal Inc

information								
I found this tutorial to be an effective method of learning	27	5	5	0	0	2	9	16
I found this tutorial to be just as effective for learning as traditional "face-to-face" classes	27	4	4	1	1	8	11	6
I feel comfortable using this web-based tutorial as a way of learning	27	5	5	1	0	2	8	16

Note. Likert-type scale: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, 5 = *strongly agree*.

Conclusions and Recommendations

We assessed the effectiveness and usability of an online introductory nematology educational training. A majority of the Extension agents who participated in the study had a need for nematology knowledge but were unsure about participating in a training delivered via electronic means. Assessing the knowledge gained by participants and participants' perceptions about the usability of the modules was essential to completing the instructional design process in accordance with the ADDIE model (Allen, 2006; Shelton & Saltsman, 2007).

Using difference in pretest and posttest scores as an indicator of change in knowledge, we determined that the modules were highly effective. E-learning should be expanded to other subject matter areas for which critical training is needed. The use of online training can help eliminate barriers that constrain Extension agents as well as help Extension disseminate timely information. Our findings support previous research indicating that online training is effective (Lippert et al., 2000; McCann, 2007). However, it was possible for participants to complete the training units in just over 2 hr. Future research should include longitudinal studies assessing knowledge retention.

Medians and modes indicate that participants' comfort levels related to assisting Extension clients with general nematology topics and properly collecting soil samples did not increase as a result of completing the modules. These findings are not surprising because participants had nematology interest or experience. At the same time, for a majority of participants, comfort levels with using web-based tutorials for learning about nematology topics and learning in general increased to "very comfortable." A majority of participants strongly agreed that the tutorial was an effective method of presenting information and an effective method of learning and that they felt comfortable using the web-based tutorial as a way of learning. Overall, feedback from participants indicated that the modules were useful and that respondents were comfortable using the training and felt the training was as effective as face-to-face instruction. The modules were easy to use with no specific training and thus were deemed usable; therefore, it is recommended that other modules be developed for asynchronous delivery for future research. Specialists or staff development personnel responsible for the development and delivery of in-service training can follow the model described here. Local agents will benefit from receiving training at their desks, with barriers related to time and travel having been eliminated.

© 2016 Extension Journal Inc

Finally, methods developed and implemented for educating county agents as a result of the findings presented here should align with the goal of meeting the needs of changing Extension clientele. County agents are important for connecting land-grant universities to communities through education, research, and outreach. Catering to the needs of a "progressive and growing constituency" includes Extension's being a leader in its use of technology (Diem et al., 2011, "Summary and Conclusion"). The training modules on nematodes should be made available to agricultural producers, and the model described here should serve to guide the development of resources for the general public.

References

Allen, W. C. (2006). Overview and evolution of the ADDIE training system. *Advances in Developing Human Resources*, *4*(8), 430–441. doi:10:1177/1523422306292942

Barker, K. R., Hussey, R. S., Krusberg, L. R., Bird, G. W., Dunn, R. A., Ferris, H., . . . Schmitt, D. P. (1994). Plant and soil nematodes: Societal impact and focus for the future. *Journal of Nematology*, *26*(2), 127–137. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2619488/pdf/127.pdf

Boone, H., & Boone, D. (2012). Analyzing Likert data. *Journal of Extension*, *50*(2) Article 2TOT2. Available at: https://www.joe.org/joe/2012april/pdf/JOE_v50_2tt2.pdf

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research.* Chicago, IL: Rand McNally.

Diem, K. G., Hino, J., Martin, D., & Meisenbach, T. (2011). Is Extension ready to adopt new technology for delivering programs and reaching new audiences? *Journal of Extension*, *49*(6) Article 6FEA1. Available at: https://www.joe.org/joe/2011december/a1.php

Gentry, M., Edgar, L. D., Graham, D. L., & Kirkpatrick, T. L. (2017). Assessing Extension Agents' Nematology Knowledge Needs and Related Resource Preferences: Implications for Trainings on Complex Agricultural Topics. *Journal of Extension*, *55*(1) Article 1FEA5. Available at: https://www.joe.org/joe/2017february/a5.php

Assessing Extension Agents' Nematology Knowledge Needs and Related Resource Preferences: Implications for Trainings on Complex Agricultural Topics

Kirkpatrick, T. L., & Thomas, A. C. (n.d.). Crop rotation for management of nematodes in cotton and soybean. Retrieved from http://www.uaex.edu/Other_Areas/publications/PDF/FSA-7550.pdf

Lippert, R. M., Plank, C. O., & Radhakrishna, R. (2000). Beyond perception: A pretest and posttest evaluation of a regional Internet Extension in-service training. *Journal of Extension*, *38*(2) Article 2FEA2. Available at: https://www.joe.org/joe/2000april/a2.html

McCann, B. M. (2007). The effectiveness of Extension in-service training by distance: Perception versus reality. *Journal of Extension*, *45*(1) Article 1FEA4. Available at: https://www.joe.org/joe/2007february/a4.php

Moodle.org. (2013). About Moodle. Retrieved from http://docs.moodle.org/25/en/About_Moodle

Pimentel, D. (2010). *Biological invasions: Economic and environmental costs of alien plant, animal and microbe species.* Boca Raton, FL: CRC Press.

Seevers, B., & Graham, D. (2012). *Education through Cooperative Extension*. Fayetteville, AR: University of

© 2016 Extension Journal Inc

Arkansas.

Shelton, K., & Saltsman, G. (2007). Using the ADDIE model for teaching online. *International Journal of Information and Communication Technology Education*, *2*(3), 14–26. Retrieved from https://uark.illiad.oclc.org/illiad/illiad.dll?Action=10&Form=75&Value=772655

University of Arkansas Division of Agriculture. (2012). *Economic contribution of Arkansas agriculture.* Retrieved from http://division.uaex.edu/news_publications/Economic_Contribution_2012.pdf

---

Copyright © *by Extension Journal, Inc.* ISSN 1077-5315. Articles appearing in the Journal become the property of the Journal. Single copies of articles may be reproduced in electronic or print form for use in educational or training activities. Inclusion of articles in other publications, electronic sources, or systematic large-scale distribution may be done only with prior electronic or written permission of the *Journal Editorial Office*, *joe-ed@joe.org*.

If you have difficulties viewing or printing this page, please contact *JOE* Technical Support