

Improving PAT and IPM Training through an Interactive Training/Testing Program

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ABSTRACT

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With funding from an USDA-ES Competitive Grant, an interactive computer training (ICT) program was developed for training and testing pesticide applicators. Questions are presented throughout the program; requiring a correct answer to proceed to new material. With an incorrect answer, the program loops back to repeat pertinent information. Learning with the ICT method was equal to traditional delivery methods while requiring 50% less time. Trainee interest and involvement was high with ICT. The log file permits printing a record of answers chosen. This record could be used by state agencies for granting PAT recertification credits, or even to test for licensing of pesticide applicators.

Keywords: computer, interactive, video, training, Oregon, testing

INTRODUCTION

Cooperative Extension personnel involved in the pesticide applicator training (PAT) certification and licensing program recognize the need for effective, high quality, training programs. A reduction in economic resources and extension personnel to conduct training are common in many states, while concerns about pesticide misuse is high. Extension personnel complain that in addition to limited time available for training activities, few training materials have been developed using the latest technologies.

Furthermore, the rapid growth in electronic technology available to the training industry greatly exceeds its adoption by extension personnel. Two reasons for this disparity includes the limited number of PAT programs developed for new technologies, and the lack of actual testing of programs to determine their effectiveness in teaching pesticide applicators.

Other impediments to effective training of pesticide applicators include limited course availability and busy schedules of pesticide applicators that hinders their attendance at training courses. These problems are especially acute for pesticide applicators living in remote rural areas, common in many western states. This project, with funding from USDA-ES

(Project 95-EPA-1-006: Improving PAT and IPM Training Through an Interactive Training/Testing Program), attempted to address these issues.

PROJECT OVERVIEW AND PROCEDURES

Oregon State University Cooperative Extension Service through the Integrated Plant Protection Center teamed with the Consultative Group, American International University, Portland, Oregon, to develop this project. The project was designed to demonstrate that interactive computer training (ICT) can provide an effective method by which pesticide applicators learn the essential elements for the safe and effective use of pesticides, without having to spend excessive time in the classroom. In addition, it was designed to demonstrate that when properly presented, interactive training can be interesting and engaging while ensuring that trainees actively participate in the learning process. This is critical to counter the commonly observed problems with traditional training methods where trainees may be totally disengaged from the training event; reading newspapers, visiting, sleeping, balancing check books, etc.

Four ICT educational units were developed using commercially available interactive learning and graphics software. AuthorWare was the primary software used. The pedagogical basis used for each educational unit was:

- Identification of the primary concepts to be learned
- Presentation of the information for a specific concept
- Multiple sensory reinforcement during information presentation
- Strategically placed questions to reinforce and test learning
- Positive reinforcement for correct responses to questions
- Selected segment retraining for incorrect responses until correct choice selected

The four educational units were:

- Current Federal and State Laws Regulating Pesticide Use;
- Comprehension of Pesticide Product Labels;
- Protecting Pesticide Handlers; and,
- Principles of IPM and its use for Codling Moth Management in Pome Fruits.

The University of Maryland Cooperative Extension Service granted permission to use four videotapes from their series "Using Pesticides Safely," for much of the basic information in the ICT program.

The interactive program uses a combination of audio, video, graphics, and text; often with two or three mediums simultaneously for multiple sensory reinforcement (Figure 1). Unlike many computer aided instructional programs, little reading of on-screen text is required with this program. As trainees progress through an educational unit, questions are presented. If

an incorrect answer is given, the program loops back to repeat the information pertinent to the question. This process is repeated until the correct answer is given. The strategically placed questions (and review in case of an incorrect answer) serve to test as well as reinforce learning. It is also an excellent means to direct or focus learning on concepts the trainer deems most critical. A trainee cannot progress through the program without successfully answering all the questions, thus preventing "shortcuts."

The program has a log file that records each answer, and presents a summary of the number of correct answers for each unit. The log file can be printed for a permanent record. The training program was installed on Pentium computers with a multimedia package and Windows 95 with QuickTime for Windows. While this program was initially designed to operate on the hard drive, it would be advisable to program it to operate from CDROM.

To demonstrate the time saving potential and the relative effectiveness of interactive learning, training/testing was conducted using two basic groups in five widely diverse sites in Western, Central, and Eastern Oregon. One group was taught using traditional classroom methods; combining lecture and discussion, slides, a video, and hands-on demonstration with personal protective equipment. The other group use ICT. The same material from the four educational units was covered in both methods. To analyze learning, all individuals were given the same pre- and post-training written exams, containing 28 questions each.

Local extension personnel advertised the training course through normal channels, explaining that the two methods of instruction were being compared. Once the group was assembled, we explained the purpose of the program, and allowed each person to chose which training method they wanted to participate in. Since we only had three

Table 1. Pre- and post-training test scores (% correct) for licensed and non-licensed individuals using traditional and ICT methods.

	Licensed				Non-licensed			
	Traditional(33)		ICT(34)		Traditional(7)		ICT(14)*	
	pre	post	pre	post	pre	post	pre	post
% correct	73.1	80.3	75.5	83.6	71.4	75.0	73.6	77.9
Std. Dev.	3.34	2.41	2.71	1.94	3.11	2.31	2.75	3.26

* () = Number of individuals in each group

computers, we provided two sets of earphones for each computer. The two persons operated the mouse on alternating units so they would have equal opportunity to control the program. They were allowed to discuss the questions and answers during the ICT sessions. However, they took the written post-training exam on an individual basis.

The two groups were further divided into licensed and non-licensed individuals.

Sixty-five individuals were licensed private pesticide applicators and two were licensed commercial pesticide applicators. Twenty-one individuals did not have a pesticide applicator license. For these individuals, the training was considered pre-license (initial) training, since they were all planning to take the state exam within a few weeks. Oregon Department of Agriculture granted 3 hours of recertification credits for those individuals with a valid pesticide applicator license.

RESULTS

The number of persons volunteering for the two training methods was surprisingly close: 40 and 48 individuals for the traditional and ICT, respectively. The traditional method required 3 hours to complete, while most individuals completed the ICT in 1.3 to 1.7 hours, in addition to the 4 to 8 minutes of instructor time at the beginning. Test scores for the two training methods were divided into licensed and non-licensed pesticide applicators as presented in Table 1.

Post-training exam scores were higher than the pre-training scores for all groups, suggesting at least some short-term learning. The average score for the licensed group was higher than for the non-licensed group. One result not anticipated was the higher pre- and post-training scores for the ICT group in both license categories. Age and years of schooling for the trainees were not documented, but general observations suggest that younger persons, often with more formal schooling, chose ICT. Nevertheless, the oldest person training (67 years), and several in the mid-50s to early 60s range, who trained with ICT were very enthusiastic about it. Many of the persons

using the ICT immediately asked if the rest of the core manual was available in this format. Virtually 100 percent of the ICT group expressed preference for this method over traditional training.

ICT appeared to hold the interest of the trainees throughout the process. Many trainees indicated that the fact that they had to remain actively involved in order to reach the end of a training unit was a very positive feature. One individual summarized it by saying "you sure can't sleep through this course!" The ability to work through the materials at their own pace, reviewing concepts and facts as needed, was considered an important advantage of ICT by most participants. They felt that this feature enhances learning and retention. One person commented that operating the mouse to progress through the program, choosing answers, and deciding when to repeat training units gave the trainee a sense of being in control of their own learning, which created a more positive attitude.

University Extension Agents were enthusiastic about the use of ICT as a tool to meet the training needs of their clientele while freeing the agents for other activities. The possibility of having a computer available for persons to walk in and train at their convenience was cited as a significant advantage by both pesticide applicators and extension agents. Many extension agents do not feel qualified to conduct pesticide applicator training and spend considerable time and effort in securing speakers and making local arrangements for such events. Participating extension agents felt that the quality of training with ICT would be consistently excellent, something they cannot always guarantee when bringing in speakers.

Lack of previous computer experience was not a problem. Several persons had no computer experience but were enthusiastic about the program. This included four Hispanic workers with marginal English language proficiency and no computer experience.

CONCLUSIONS

Based on test scores, comments from the participants and county extension agents, and general observations by the researchers, the following conclusions are presented:

1. Learning with the ICT was as successful as learning with the traditional method while requiring significantly less time (1.2-1.7 hour plus 4 to 8 minutes of the instructor's time, versus 3 hours).
2. Both pre- and post-training test scores were slightly higher for persons choosing the ICT method, as was percent increase in correct answers in post-training test scores.
3. Persons training with ICT expressed an enthusiastic preference for this method.
4. ICT held trainee interest and required active participation throughout the training.
5. Lack of prior computer experience was not a problem.

ADDITIONAL COMMENTS AND OBSERVATIONS

This program has the potential of being used for granting recertification credits (and perhaps even for the certification exam) by authorized agencies because of the log file feature. The log file records each answer the trainee selects for each question, with a summary of the number of questions correctly answered for each unit. When a trainee begins a unit, they must enter a name and an identification number. Extension personnel could verify identity at this point. At the conclusion of the training, the file could be printed and submitted to the appropriate agency for assignment of recertification credits, or possibly for initial certification testing.

Figure 1. Selected video segments from the Interactive Computer Training program at Oregon State University.



Movie - Click on image to play



Movie - Click on image to play



Movie - Click on image to play



Movie - Click on image to play