

HAZARDOUS WASTE INSPECTOR TRAINING: MULTIMEDIA INFORMATION TRANSFER

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ABSTRACT

A major challenge facing hazardous waste management efforts is building a competent inspector workforce. Both federal and state governments acknowledge problems of inexperienced staff, lack of adequate training and insufficient funding and staff support for training. This article describes a unique collaboration between a government agency and academia to develop an effective entry-level training program. The agency provided the setting and content in terms of identifying training needs and procuring technical materials. The university offered innovative educational approaches and technology transfer systems. The guidelines for the design of the training materials focused on coherence, participation, and flexibility. The result was a versatile training program with a set of materials that encourage participant involvement and input. The guidelines have broad application to other efforts at information transfer.

The United States generated 275 millions metric tons of hazardous waste in 1985 [1]. Management of these materials to minimize their environmental impacts and their threats to human health has become of foremost concern. Under the Resource Conservation and Recovery Act of 1976 (RCRA), Congress authorized the U.S. Environmental Protection Agency (USEPA) to establish a regulatory framework for managing these materials from the time of their manufacture to their final disposal. The task is an enormous one, one which has fallen primarily on the states.

Recently the General Accounting Office (GAO) released a report highlighting the difficulties encountered in hazardous waste inspection efforts [2]. This report did not come as a surprise to most state agencies responsible for monitoring the generation and handling of hazardous waste. They also acknowledged the

complicating factors cited by the GAO, namely, inexperienced staff, lack of adequate training, and insufficient funding and staff support for training.

The inspector workforce, due to a rapid turnover rate and tremendous growth, is inexperienced. High turnover (an average of 19% in 1986 for the states) coupled with a 79 percent growth in demand for inspectors has decreased the experience levels of inspection staff. The average state inspector has just over twenty-seven months of experience. Furthermore, the need to bring people on line has resulted in inconsistent inspector qualification requirements, making it all the more critical that there be effective guidance and training.

Yet, at this point, both the states and the USEPA see inadequate training as the major cause for poor inspection quality. Few entry level personnel come with adequate preparation. It requires a considerable investment of time to bring new personnel "up to speed" just to acquire basic knowledge of job responsibilities. All too often, the pressures on an agency to perform inspections take priority. New inspectors typically receive informal training, which consists of reading guidance documents and manuals, and apprenticing on-the-job with a more experienced inspector. Not only are many of the guidance documents out of date, the staff overseeing training for new recruits are often not aware of current technologies or practices. When there have been more formal training opportunities, the quality and consistency have been erratic.

Finally, the necessary commitment in terms of funding and staff for training has not been made. At the USEPA level, higher priority has been given to efforts such as development of regulations. As a result, there has been neither time nor money allocated to updating guidance documentation and instituting a comprehensive training program.

AN EDUCATIONAL DESIGN PLAN

The mandate is clear: to manage hazardous waste safely and effectively, these agencies need to train and maintain a work force that is competent in the technical and policy aspects of the waste management field. The Association of State and Territorial Solid Waste Management Officials (ASTSWMO) established itself as the central coordinating body to assist states in meeting training needs and for sharing training resources.

In response to state-identified need for permanent, in-house, in-state entry-level training capabilities, ASTSWMO focused its early efforts on providing critical short-term training in areas with rapid turnover and expansion. Its goal was to develop two entry-level training courses to supplement the typical background and experience of incoming entry-level inspectors. These courses needed to provide new inspectors with a basic understanding of waste management concepts, regulatory requirements and enforcement procedures, personal protection and safety. Furthermore, to meet the different training situations in the states, this training program needed to work both as a stand-alone workshop training package

and be effective in an optional self-paced learning application. Thus emerged the opportunity for a unique collaboration: while ASTSWMO had the administrative, technical and "hands-on" expertise needed for this training, it looked to The University of Michigan's School of Natural Resources (SNR) for guidance on developing an effective, state-of-the-art teaching tool. SNR offered a tradition of environmental education and professional-level training, as well as access to sophisticated video capabilities and one of the few waste management programs in the country. SNR found this arrangement appealing because it presented an opportunity to act on the School's concerns about the implications of hazardous waste management on the environment. This project offered a setting in which the School could apply innovative educational and technology transfer systems to the pressing needs of an applied field. Finally, the very nature of the collaboration fit SNR's philosophy about empowerment and participation. The relationship established here was not that of the typical client and consultant. Rather, it relied heavily on participation and ongoing feedback from all involved parties in the development of the program and in monitoring and adapting the program in the field.

CONCEPTUAL DESIGN OF THE TRAINING MATERIAL

The intent of the first entry-level training program was to meet the immediate needs of RCRA training at the state level and to serve as a model program for other training efforts. The first project consisted of three interconnected parts: the *Hazardous Waste Inspector Training Manual*, a video tape component, and the *Train-the-Trainer Manual*.

The *Hazardous Waste Inspector Training Manual* presents the content of the program [3]. It lays out the key aspects of RCRA, with special emphasis paid to those areas which are most important or are seen as most difficult for trainees to understand. The manual also serves as on-the-job reference guide.

The videotape component consists of specialized video units that correspond to the chapters of the manual. These individual units highlight the content in each chapter and reinforce important terms, concepts and regulations. Each video unit is "bookended" with a starting and ending point so that it can be inserted wherever it best fits into the overall training program. The videotape lasts 1½ hours, with units averaging 8-10 minutes.

Supplemental to the manual's videotape are three, one-half hour presentations, one a detailed overview of RCRA, one on sampling and one on safety. They provide more specific information than found in the manual and can stand alone as supportive training tools.

As mentioned above, many states do not have specific training staff. Typically, the more-experienced inspectors provide entry-level training. While these people have the technical expertise, they often lack experience teaching groups. The *Train-the-Trainer Manual* is a straight-forward guide to using the training

materials and to running workshops in general [4]. In addition to outlining the nuts-and-bolts of organizing a workshop, the manual discusses group dynamics and effective teaching and communication techniques.

Goals in Design: Coherence

Together, the *Inspector Training Manual*, videotapes, and the *Train-the-Trainer Manual* offer a flexible, coherent framework for the training program. The emphasis on coherence derives from research on effective teaching techniques [5]. Critical to one's ability to grasp new material is its organization or structure. Information that has a storyline and key points or "landmarks" to guide one through that story is more memorable and easier to follow. The design and organization of the *Inspector Training Manual* reflects an effort to give entry-level inspectors such a "road map." The manual presents a basic overview and emphasizes major concepts with outlining and headings. Extensive cross-referencing and glossaries provide linkage across different sections of the manual and to other resources. Answers to test questions for each chapter often include additional explanations and references back to the manual.

An adage for effective speaking quips, "tell them what you are going to say, say it, then tell them what you said." A variation on this kind of reinforcement runs through these materials. The videos reiterate key elements discussed in the manual. A central focus at pilot workshops for training trainers involved consciously modeling the teaching behaviors described in the *Inspector Training Manual* to demonstrate, reinforce, and, in effect, "prove" the effectiveness of the strategies discussed here.

Goals in Design: Participation

As mentioned above, SNR's philosophical stance insisted on the active involvement of ASTSWMO as the contracting agency, and of those planning to use the program. These field experts, representing various regions of the country, comprised the program's advisory committee. They added insight to nuances in the RCRA regulations, insuring a broad-based confirmation of the content information, and identifying state-specific adherence to or variance from federal standards. The members provided invaluable technical and "real world" knowledge and gained a sense of ownership with the program itself. As a result of this exchange, the training included concepts these parties felt were important and was responsive to needs they had expressed.

ASTSWMO Involvement

In terms of the program design itself, the advisory committee developed the working outline and contributed supplemental materials for the *Inspector Training Manual*. Furthermore, it facilitated a drafting procedure that incorporated

prompt, frequent feedback between the manual writing staff and those who would use the training materials. Experienced inspectors throughout the country reviewed all drafts of the manual. A cadre of these resource people were available to the SNR staff to clarify comments on the drafts. They also attended face-to-face working sessions to review the overall program. A sub-group of them helped identify and procure visuals for the videotape. They not only made specific suggestions for script development, but arranged for use of existing video footage and on-site assistance for video production work. ASTSWMO sponsored two pilot workshops led by the SNR team to test the program effectiveness. Workshop evaluations and comments that would strengthen the program were subsequently incorporated into the training program.

Trainees' Involvement

Participation, in another sense, meant incorporating into the program ways for involving the trainees. The program achieved this in three ways: 1) in the type of activities used in the workshop training; 2) by soliciting evaluations and feedback during and across workshops; and 3) by encouraging networking opportunities.

Training Activities – There are many ways to convey content. In addition to the traditional lecture, this program stresses using interactive approaches coupled with appropriate technology. Small groups work is strongly encouraged to provide a less intimidating setting for people to ask questions, share what they know, and to work through confusing material. Furthermore, while learning the technical content of the training program is critical, small group interactions help trainees develop communication and group skills that will prove invaluable in the field.

Of course, the voice of the experienced inspector is an essential element of the training program as well. The "Ask the Inspector" portion of the training lets trainees find answers to questions they see as important. For this activity, trainees break into small groups to formulate questions they have about a given topic. When the larger group reconvenes, each of these smaller groups has an opportunity to ask experienced inspectors for their responses. This activity has consistently proved not only provocative and engaging, but has often surfaced issues and concerns that otherwise would not have been addressed.

Feedback: Debriefing and Evaluations – This training program is not static. It is designed to adjust to fit the specific needs of its users. Mechanisms built into the program for monitoring during and between workshops include sessions for debriefing "how the workshop is going" and gauging what the learners want. Every workshop concludes with a comprehensive evaluation for improving later workshops. Evaluations are often equated with criticism and therefore avoided. Here, they are seen as vehicles for providing valuable feedback. They tell the trainer whether or not an experiment worked, whether an invited speaker was

interesting and effective. And, as importantly, the evaluations tell the participants that their experience of the workshop matters.

Networking Opportunities – More than content gets shared at a workshop. Often a training workshop is a rare opportunity for inspectors or other field personnel to discuss their work with others. Newcomers leave with a shared experience and new contacts to call upon. This program also creates a contact point and opens lines of communication with more experienced inspectors. Especially in situations where people have come from a number of states for training, a workshop provides a setting for sharing new ideas, approaches, and perspectives on the field.

Goals in Design: Flexibility

The concept of flexibility in this project covered a broad range of areas: in teaching methods, program design, and in using and updating the training materials. In the teaching aspect of the program, flexibility meant providing a variety of different approaches to discovering what would fit with different learning styles. Consequently, the program includes visual and written materials. The workshops utilize small group work, lectures, presentations, and discussions. Flexibility in terms of the program design involved offering trainers several design options to fit the schedule, staff and cost constraints of their training situation. The *Train-the-Trainer Manual* includes agendas and guidelines for 3, 4, and 5 day workshops. For those who cannot afford or do not have enough trainees for a workshop, the program can be adapted as a self-paced module. Here the trainer has access to a series of test questions and some pacing guidelines for executing the training.

The materials themselves are adaptable and easily used. It is easy to access any unit of the videotapes quickly and to reorder them to match the training schedule or to select segments for viewing specific units. The three-ring manual binder facilitates copying and the incorporation of state-specific materials.

CONCLUSION

This collaboration between the academic community and governmental agency has been very productive. The agency provided the setting and the content in terms of identifying its training needs and procuring technical materials. The University offered innovative educational approaches and technology transfer systems. Both parties recognize aspects of the existing program need improvement, and long-term evaluations may suggest further revisions. Nevertheless, this unique collaboration was successful enough that the parties have continued working together to develop additional environmental training programs and long-term plans for evaluating their effectiveness.

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ACKNOWLEDGMENTS

The authors wish to acknowledge the assistance provided by Dr. Paul Nowak and Michael Berger on earlier versions of this article.

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