

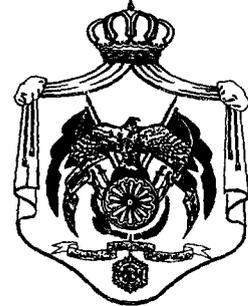
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# Water Quality Improvement and Conservation Project

Promoting Water  
Conservation by Training  
Jordan Valley Farmers

Ross E. Hagan  
Darryl Kuhnle

*The Hashemite Kingdom of Jordan*



*Ministry of Water and Irrigation*



The Technical Assistance Team Includes:

**Development Alternatives, Inc.**  
Science Applications International Corp.  
Harza Environmental Services, Inc.  
Development Associates, Inc.



## **PREFACE/ACKNOWLEDGMENTS**

This report is the result of a four week consultation. The purpose of the consultation was to provide guidance in the preparation of training material for farmers and to conduct a workshop on public awareness communication. The executive summary on the following page outlines the consultant's findings.

Mr. Darryl Kuhnle, an Agricultural Communication Specialist, worked with several individuals from the University of Jordan. Dr. Muhammad Shatanawi, Director, and Eng. Ali M. Al-Shrouf of the Water and Environment Research & Study Center; Dr. Ahmad Abu-Awwad, Faculty of Agriculture; and Dr. Abdullah Arar, Consultant; were all involved in preparing training materials for farmers. These individuals are working under a subcontract supervised by Dr. Ross E. Hagan, who heads the WQIC component for which the training materials are being prepared. Ms. Coleen Brown supervised the conduction of the workshop on Public Awareness Communication

Special appreciation is given to Dr. Muwaffaq Saqqar, Project Coordinator; the members of the Irrigation Working Group; and to Development Alternatives, Inc., as represented by Edwin D. Stains, Chief of Party, for their cooperation and confidence.

## EXECUTIVE SUMMARY

At the invitation of the Water Quality Improvement and Conservation (WQIC) Project and of the Irrigation Working Group of the Ministry of Water and Irrigation in Amman, Jordan, Darryl Kuhnle, an Agricultural Communication Consultant for Development Alternatives, Inc., visited Jordan from March 17 to April 18, 1995.

The main purpose of this assignment was to provide technical assistance to the Water and Environment Research & Study Center (WERSC) in the design of a training curriculum. WERSC is a subcontractor to the DAI/WQIC Project in the Irrigation Water Management component. The training curriculum was to focus on micro-irrigation with a target audience of farmers and others concerned with the subject.

As expected, a one month consultancy served only to assist the WERSC team to begin developing a curriculum for training Jordan Valley (JV) farmers in irrigation management. The draft curriculum outline provided by the consultant to WERSC concentrates on suggested media, materials and methods, without considering the delivery length of each unit identified in the document. To arrive at a final document that is practical for trainers to use, it will be necessary for WERSC to determine where lesson units can be consolidated into modules which can be more easily identified and delivered in realistic time periods. The complete package should consist of individual modules which are semi-independent. A trainer should be able to pick and chose from among the titles to put together a training session customized to meet the needs of a given audience.

The main body of this report contains a detailed discussion of adult education principles. Learner motivation, program planning, program design, program implementation, and program presentation are covered. Coverage of this material is considered necessary because of the limited experience in-country with developing training courses for adult audiences, whose needs are quite different from those of young students. The material in this report should be of use to the contractor who is developing training modules for farmers as well as to MWI personnel, and to others who are involved in the development of in-service training courses for the Ministry.

In addition to working with the WERSC, the consultant assisted the WQIC Project Public Awareness advisor to conduct a one-day workshop in identifying the changes in behavior which a public awareness campaign should encourage in order to promote water conservation and interest in water quality. The additional purpose of this workshop was to prepare Jordanian counterparts for participating in a second workshop in setting public awareness communication goals and objectives for behavioral change scheduled to begin on 8 April, 1995.

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## ACRONYMS

DAI	Development Alternatives, Inc.
JES	Jordan Environment Society
JV	Jordan Valley
MWI	Ministry of Water and Irrigation
NCARTT	National Center for Agricultural Research and Technology Transfer
UJ	University of Jordan
USAID	United States Agency for International Development
WERSC	Water and Environment Research & Study Center
WQIC	Water Quality Improvement & Conservation

## TRAINING TO PROMOTE WATER CONSERVATION

### Introduction

By the provision of training, information and assistance, the WQIC Project can have an effect on those practices identified as impacting negatively on the conservation of irrigation water. Under the Project, funds are designated for subcontracting with a Jordanian organization for Irrigation Management Training/Communication.<sup>1</sup> A subcontract has been written with the Water and Environment Research & Study Center at the University of Jordan to accomplish several tasks.

- Preparation of training modules on aspects of trickle irrigation design, operation, and maintenance;
- Field testing of the prepared modules;
- Evaluation of the field test and revision of the modules;
- Field testing of the revised modules; and
- A final evaluation and revision of the training modules.

WQIC Project team members from the MWI Irrigation Working Group are involved in all phases of subcontract execution.

A basic requirement of the subcontract is that all training modules developed should use adult education principles. An effective adult education program, which is required for training practicing farmers, is structured by using adult motivational factors in program development. Formulation of educational strategies requires great sensitivity to adult motivational factors. Learners must be convinced, at the start of each session, of the "need to know." They must also believe that the new knowledge will benefit them in their lives. Each session should include a discussion/problem period where learners can share their experiences and apply the new knowledge. Action strategies are used at appropriate times to encourage learners to synthesize and evaluate. The program must be designed so that it is flexible and can adapt to learners' needs.

Staff at the University of Jordan have technical knowledge of the subject area but limited experience in teaching adults. This limitation is not uncommon. Structuring effective training for adults requires different techniques than one would use for young inexperienced students. To fill the void in knowledge about adult education, this report concentrates on the techniques for developing and delivering effective training for adults.

In addition to the staff at the University, the material in this report should be of use to MWI personnel and to others who are involved in the development of in-service training courses for the Ministry.

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<sup>1</sup> WQIC Project Contract, page 70 of 92, Table III, Comp. 3.b.

## **Adult Motivation**

In order to teach adults effectively, one must understand how adults are motivated to learn. Structuring a successful adult education program requires the acceptance of several assumptions:

1. Adults need to know why they need to learn something before undertaking to learn it. Consequently, the first task of the trainer is to help the learner to become aware of the "need to know." Potent tools for raising the level of awareness of the "need to know" are real or simulated experiences in which the learner discovers for himself that he lacks the knowledge/experience to accomplish what would ultimately be useful to him.
2. Adults consider themselves responsible for their own decisions, for their own lives. They want to be seen and treated by others as being capable of self-direction. They resent and resist situations in which they feel others are imposing their wills on them. This presents a serious problem to the trainer.
3. Adults approach an educational activity with a great volume of experience. This assures that in any group of adults, there will be a wide range of individual differences. Consequently, for many kinds of learning, the richest resources for learning reside in the adult learners themselves. Hence, the greater emphasis in adult education on experiential techniques — techniques that tap into the experience of the learners, such as group discussion, simulation exercises, problem-solving activities, case method, and laboratory methods — in preference to lecture techniques. A subtle reason for emphasizing the utilization of the experience of the learners has to do with the learners' self-image. In any situation in which adults' experience is ignored or devalued, they perceive this not only as rejecting their experience, but also as rejecting them as individuals.
4. Adults become ready to learn those things they need to know and need to be able to do in order to cope effectively with their real-life situations. Readiness can be induced through exposure to models of superior performance, simulation exercises, and other techniques.
5. Adults are life-centered (or task-centered or problem-centered) in their orientation to learning. Adults are motivated to devote energy to learn something to the extent that they perceive that it will help them perform tasks or deal with problems that they confront in their life situations. Furthermore, they develop new understanding and learn new information, skills, values, and attitudes most effectively when these are presented in the context of application to real-life situations.
6. While adults are responsive to some external motivators (better jobs, higher salaries, promotions, and the like), the most potent motivators are internal pressures (the desire for increased job satisfaction, self-esteem, quality of life, and the like.)

The emotional climate required for adult learners has been described as one that is welcoming and supportive, with rules that are made and administered for the welfare of the learner and not for the ease and comfort of the personnel in the educational institution. In learning situations outside the classroom, a clear understanding of the essential features of the environment are required if effective and positive learning is to take place. For the learning to be effective, the learners should have an opportunity to study, discuss, obtain feedback, test solutions, and evaluate the field exercise.

The trainer of adults must:

- establish a climate conducive to learning;
- create a mechanism for mutual planning;
- diagnose the needs which the new information will meet;
- formulate program objectives/program content which will satisfy these needs;
- design a pattern of learning experiences;
- conduct the learning experiences with suitable techniques and materials; and
- evaluate the learning outcomes and rediagnose the learning needs.

### **Program Planning**

In this context, the planning process is a collaborative partnership among the teacher (the agent of change), community leaders — who emerge as such without having been formally selected — and learners. It is the combined function of these three elements to identify, assess, and analyze the learners' needs and to develop an educational program or learning activities which will help the learners meet those needs. Planning provides for a rational response to uncertainty and change. Planning focuses attention on goals and objectives. Planning is important as an aid to resource allocation.

A needs assessment provides environmental input into the process of identifying objectives. The following questions should be used to identify, collect, analyze, and present data which will then indicate the significance or extent of a given problem area or need:

- Does a need really exist?
- What is the basis of the need?
- How widespread is the need?
- What is the relative importance of the need?
- How do people feel about the seriousness of the need?
- What are the potential consequences if no effort is made to fulfill or meet the need?

## **Program Design**

Six tasks are involved in the design of a long-range planned program.

1. The expressed needs of the target population, which are identified, assessed, and analyzed in the preliminary planning stages, are translated into general areas(macro) of interest or concern. These general areas become the focus of the planned program. For each general area, there is a hierarchy of more specific needs(micro) which must also be addressed.
2. At least one objective is formulated for each need (macro or micro). The objectives specify the learner behavior sought in fulfilling the macro or micro needs. Macro objectives reflect the ultimate (terminal) behavior change desired in the learner. Following are criteria for judging the validity of an objective:
  - Is it, generally speaking, a guide to action?
  - Does it suggest alternative courses of action?
  - Is it explicit enough to suggest a certain type of action?
  - Can it be measured?
  - Is it time-limited?
  - Is it ambitious enough to be challenging?
3. Formulate general educational strategies: A strategy is a carefully designed plan of learning activities whose purpose it is to achieve the general objective along with the more specific objectives which are part of the general objective. The learning activities must be ordered and sequenced so as to reinforce one another and so as to stimulate interest, provide information, and ultimately encourage the desired change.
4. Intended outcomes must be identified for each general objective, outcomes which are based on the cumulative effect of attaining the more specific and smaller scale objectives.
5. Estimate the time required to complete each component of program strategy.
6. The program designer must provide for the gathering of information which will be used to evaluate the program. Criteria for evaluation will include whether or not the stated general and specific needs of the farmers/students are being met. Criteria will also evaluate whether or not the organization itself needs to refine or change how or what it endeavors to teach. Trainers of adults must remain sensitive to the specific needs of adult learners and must be willing to adapt or redirect learner experiences if monitoring, feedback, and the teachers' own observations indicate the need for such change.

## **Program Implementation**

All normal people possess the desire to know, to understand, and to improve their skills. However, each individual has a distinctive learning pattern. A learning method must

ultimately be viewed as a special way of organizing experience so that it will help convey knowledge or skill. Or, it can help to develop sensitivity. The effect of a method depends not so much on its inherent efficacy as on the intent and the talents of its user and on the learning pattern of the individual.

The decision points and components of an adult education framework or format can be outlined as follows:

- A sequence of events is devised. In order for the sequence to be as educational as possible, events should be arranged so as to follow the natural progression of learning. In such a sequence, each succeeding event would build upon the previous one.
- At the start of a program, the design of the learning program should be made clear to all concerned, i.e., the learners must be informed of what is to occur. Any changes in the design should be fully communicated as they occur.
- The final results of the activity are measured and appraised upon the termination of the activity. However, both processes go on during an educational activity as well. Measurement is based on quantitative data; appraisal is an estimate of success based on qualitative and other data.
- The completed program is examined to determine if it should be institutionalized as a new educational activity. If the program is judged a success, it may be offered again with few changes. Otherwise, the program should be dropped or restructured before it is offered again.

When the adult is able to be an active part of the process, the learning becomes more meaningful. For example, a series of lectures with no opportunity for interaction or discussion could "turn off" or discourage adult learners who have serious questions about the material. Active participation enables adults to compare their perceptions with those of others. This comparison either confirms what they already feel/know or it changes their ideas partially or completely.

The content of the material to be taught can have a significant influence on the effectiveness of a given teaching strategy or method. Some content requires a step-by-step sequential presentation because each successive portion of material builds upon that previously presented. Other content may be absorbed globally and may be presented without regard to sequence because a large amount of information must be comprehended before any further use can be made of it. Whatever the situation, the trainer must be aware of the variety of teaching strategies that can be used and their relative effectiveness in different learning situations with different types of material and with students who learn differently.

Many traditional models of teaching/learning interaction presume that the major purpose of the activity is dispensing information. These models are less popular in adult education because:

- adults tend to have a broad base of knowledge and experience;

- they usually exert some self-direction in their learning activities; and
- they generally choose learning activities directed to application or problem solving in preference to information or content-centered presentations.

Decisions about what information to present in a course and how to present it should be based on a clear knowledge of the following: (1) needs and expectations of the participants; (2) characteristics of the subject matter; and (3) needs or requirements of the sponsoring agency. This calls for careful planning before the course and constant adjustment during it. Consequently, formative evaluation, (i.e., gathering information to improve the course while it is ongoing), is important to course improvement.

Busy farmers are unlikely to schedule enough time away from their farm to participate in the entire training program. Therefore, since the focus of is program is to train practicing farmers, the training program should be structured in this modular format. With careful selection of the material to include in a module, the trainer will be able to pick and choose modules to tailor training sessions targeted to specific topics identified by farmer trainees. There are advantages to splitting presentation of the material into separate and focused sessions. The introduction of new concepts is reduced to a level where trainees can readily absorb all the new concepts introduced and where there can be sufficient time between sessions to allow farmers to put into practice what they have learned.

### **Content Presentation**

Lecture and/or action, are the approaches used for information presentation. Lecture is the approach most commonly used in a structured educational setting.

#### **Lecture Strategy**

Lecture strengths:

- A lecture is relatively easy to plan and can be more economical than other teaching strategies.
- Facts and related information can be presented in an orderly and systematic manner.
- A skillful lecturer can stimulate an audience to become more knowledgeable about a topic or issue through further inquiry or related activities.
- Information and facts can be given to a large number of people in a relatively short time.
- Some adults would rather listen than read or become involved in a discussion.

Lecture limitations:

- Some trainers are unable to plan and organize a talk for an audience.
- There is usually no convenient way to determine to what extent learning has occurred other than by examination.

- The speaker's behavior may distract the listener from the actual talk (for example, fixed posture, reading from notes, no eye contact with the audience, repeated hesitations, and failure to respect the audience's expertise or interest).
- In general, learning begins to diminish after about fifteen minutes of listening to a lecture.
- Long-term retention of content presented in a lecture is not very likely.

Knowing that the attention span of his audience is limited to approximately fifteen minutes, the lecturer would be well advised to plan some activity to stimulate the audience. One suggestion is to shift the focus from trainer to student and back again every ten to fifteen minutes so that interest and enthusiasm are not lost. A combination of lecture and discussion, media activities, and other mini-strategies can liven up the lecture with participation and response from the listeners.

Lectures should be varied in order to appeal to different types of learners during the course of one lecture. Whatever the type of lecture, the trainer must consider other factors in developing the strategy. The use of verbal illustrations and examples can enhance learning. Simple language, relatively short sentences, emphasizing no more than five or six points, and speaking sufficiently slowly will increase student comprehension and retention. Time should be planned for learner responses and questions.

#### Effective Lectures:

- Fit the content to the time available. Do not elaborate too much or introduce too many ideas.
- Vary the mode of presentation. Use examples, physical movement, and visual materials whenever possible.
- Follow a logical sequence and use illustrations that relate to the audience's background and experience.
- Tell the listener: (1) what you plan to accomplish; (2) how you plan to accomplish it; and (3) how long it will take. Afterwards, (4) summarize what you have said.
- Stimulate the audience as often as possible. Pay close attention to its reactions and be prepared to change and improvise accordingly.
- In the classroom, provide learners with opportunities to ask questions or present different perspectives on an issue. Allow learners to interrupt the presenter at any point to seek clarification or to direct the trend of the presentation to the needs or interests of the audience. This is especially useful when the subject matter is complicated or difficult for the audience to follow or when the presenter would benefit from audience input during the presentation.
- Always provide an appropriate ending that follows from the material presented.

## **Action Strategy**

Action strategies are teaching activities in which the learners are physically as well as intellectually active during the learning process. The great advantage of participative strategies is that they seem natural and meaningful to adult learners provided that they are well designed.

Most action strategies do not lend themselves to the presentation of large amounts of information. On the other hand, when the purpose of the action strategy is either to use or to evaluate information, then action strategies become very effective approaches. Certainly, discussion can permit the learner to apply or analyze cognitive information. However, action strategies also provide the opportunity for the learner to apply or analyze newly-acquired information. Some form of practice or "doing" is frequently necessary before we truly absorb this newly acquired information and then move on to generalize and to put it to broader use. Practice--an action strategy--becomes even more necessary if the content we are learning is to be combined with other information and then synthesized or if we are to pass judgment on its worth.

To be effective, care must be given:

- to personal and interpersonal relations among the learners;
- to alternative strategies for the times when action may not go as planned; and
- to the timing of the various steps involved in the methodology.

## **Subject Coverage**

By contract the training lesson topics to be covered in lesson modules will include:

Operation and Maintenance of the on-farm irrigation system (hardware):

- pumps
- engines
- media filters
- mesh screens
- fertilizer injector equipment
- mainlines
- submains or manifolds
- laterals
- other system components (valves, gages, pressure regulators, flow meters, emitters)

Management of the irrigation process (software):

- crop water requirements
- scheduling of irrigations
- quantity of water to apply (time to let the system run)
- effect of water quality on irrigation schedules and application quantities
- leaching requirements and timing

Evaluation (both hardware and software) of the irrigation process:

- overview of evaluation procedures
- what the results mean
- how to use the results to improve efficiency

Each of the topics should be presented as a complete lesson module with as little reference to other modules as possible; some of the topics may require subdivision. This will entail some repetition but will allow the trainer maximum flexibility in putting-together a training session for a group of trainees. He need only use those modules appropriate for the group.

### **Recommendations**

Training material should take into account the following:

- Focus the training material on what the trainee can use. Avoid detailed theoretical coverage of a topic.
- To avoid over-loading trainees with new information, each module should cover only one topic, e.g. irrigation scheduling. Subdivide topic coverage into more than one module if required.
- Plan to cover a broad subject area, e.g. operations, during a series of training sessions spread out over time. Each training session should be focused on a single topic or on a few related topics.

Training session presentation:

- The first training session should concentrate on what is of most importance to the audience.
- Present the material using discussion and field exercises as much as possible to draw trainees into presentation of the material.
- Use a hands-on presentation of the material as much as feasible.
- Use trainee farms and irrigation systems for all field exercises.

## ANNEX A

### SUGGESTED METHODS FOR CURRICULUM PRESENTATION

- |    |   |  |
|----|---|--|
| 1. | Ice Breaker   | Do "round robin" introductions   |
| 2. | Presenting course content                                 | Use informal Lecture<br>Use Overheads<br>Use Slides  |
| 3. | Do calculations   | Use flip charts, black/white boards  |
| 4. | Show a process  | Use video<br>Go on field visits<br>Do lab demo   |
| 5. | Show an existing system                                   | Use slides   |
| 6. | Do assessments  | Go on field visits<br>Do lab demo  |
| 7. | Sharing information                                       | Group discussions<br>Do group interviews<br>Do group reports   |
| .  | "Comic relief"  | Charicatures (cartoons) showing something funny about irrigation problems, mistakes, or some content that is highly technical and potentially boring |
| 9. | Strengthening an important point while presenting content | Hold up cards or "stick puppets" relating to the content   |

## ANNEX B

### LIST OF PRINCIPAL CONTACTS DURING CONSULTANCY

#### Government of Jordan

Ministry of Water & Irrigation  
PO Box 69  
Sewelih, Amman

Ph: 962-6-683100  
Fx: 962-6-699-344

Dr. M. Saqqar  
WQIC Project Director

Dr. Hani Rashid  
Senior Irrigation Engineer  
Irrigation Working Group

Mr. Muhammad S. Awameleh  
Senior Counterpart, Public Awareness

Ms. Hala Abu Nuwar  
Counterpart, Public Awareness

Mr. Yasser K. Nazzal  
Irrigation Engineer  
Irrigation Working Group

Mr. Jamal Al Katib  
Public Awareness Representative  
Jordan Valley Authority

Mr. Sami Abbassi  
Public Awareness Representative  
Water Authority of Jordan

#### University of Jordan

Water and Environment Research & Study Center  
University of Jordan  
Amman

Ph: 06-843-555  
Fx: 06-840-150

Dr. Muhammad Rashid Shatanawi  
Faculty of Agriculture  
Director, WERSC

Dr. Ahmad Abu Awwad  
Irrigation Engineer

Mr. Ali Muhammad Al Shrouf  
Agricultural Engineer

## **Jordan Water Quality Improvement & Conservation Project**

Development Alternatives, Inc.  
PO Box 851532  
Al Suwifiyah 11185  
Amman

Ph: 06-680-100 x 351  
06-699-344  
Fx: 06-699-344

Mr. Edwin Stains  
Chief Of Party (COP)

Ms. Coleen Brown  
Deputy COP  
Public Awareness Advisor

Mr. Dario Dal Santo  
Senior Ground Water Hydrologist  
Management Information System Advisor

Dr. Ross E. Hagan  
Irrigation Engineer  
Irrigation Management Advisor

Dr. Robert W. Smail  
Training Management Specialist  
Human Resources Advisor

Ms. Naomi Tannenbaum  
Project Administrator

## **Jordan Environment Society**

Street Adbul Hamid Badias  
Bldg 67, PO Box 922821  
Shmaisani, Amman 11192

Ph: 06-699-844  
Fx: 06-695-857

Mr. Muneer Adgam  
Coordinator

Mr. Muhammad Aisch  
Public Awareness

Ms. Maha Ashar  
Public Awareness

## **USAID/Amman**

US Embassy  
PO Box 354  
Amman

Ph: 06-820-101

Mr. Carl Dutto  
Supervising General Development Officer  
Water, Environment & Agribusiness Office

Mr. Abdullah Ahmad  
WQIC Project Officer

**Private Sector & Other Organizations**

Science Applications International Corporation (SAIC)  
San Diego, CA

Mr. Paul F. Demmert  
Scientific Professional  
SAIC/St. Louis, Missouri Office

Mr. Kenneth A. Beeman  
Senior Analyst/Logistician  
SAIC/Gaithersburg, Maryland Office

German Agency for Technical Cooperation (GTZ)  
PO Box 926238  
Amman

Ph: 06-667-021  
Fx: 06-683-402

Dr. Remy L. de Jong  
Advisor, Water Management

Dr. Peter Ohlmeyer  
Advisor

Dr. Abdullah Arar  
Director, Agriculture Unit, Arab Consult  
PO Box 830190  
Amman

Ph: 06-810-543  
Fx: 06-824-532

Dr. Krishna V. Mayenkar  
Vice President, Industrial & Government Services  
Harza Consulting Engineers & Scientists  
Sears Tower, 233 S. Wacker Drive  
Chicago, IL 60606

Ph: 312-831-3800  
Fx: 312-831-3999