Information Processing And Technology Transfer In A Developing Country

by Harry A. Carey

The Pennsylvania State University, along with Tennessee State University, is contractor on the USAID-funded Swaziland Cropping Systems Research and Extension Training Project. In addition to research and Extension objectives, Penn State University staff designed and implemented an information component for the Swaziland Ministry of Agriculture and Cooperatives. The evolving information system is interactive, involving many people from the researcher to the Swazi farmer. This helps insure the usefulness of educational programs and materials. A cooperative training effort helps Extension field staff understand technical recommendations, use educational materials generated by the Information Section, and improve delivery of educational programs. This information/extension system is becoming increasingly effective in delivering practical recommendations that are useful for increasing farm productivity.

Many international development professionals are recognizing the importance of systematic information processing and the teaching of communications skills. These activities increase the likelihood of completing the "technology transfer" of practical recommendations that are provided by research. Added benefits accrue when an information system interacts with research and extension in a cooperative effort to produce practical, useful educational materials.

The Swaziland Cropping Systems Research and Extension Training Project (CSRET) began in 1982. Through contract extensions, the project will continue within the Ministry of Agriculture and Cooperatives (MOAC) to October 1991. The major goal is to increase the viability of farming by developing and effectively extending cropping systems recommendations relevant to the needs of the Swazi farmer. This is being accomplished through three project components: cropping systems research, agricultural information, and extension training.

Recommendations for increasing agricultural production began to emerge following several years of research activity in Swaziland. It was hoped that this information, along with information adapted from neighboring countries, would be transferred in a meaningful and practical way through the extension worker to the farmer. In developing recommendations, three lines of reasoning were pursued: (a) that the educated, professional staff has most of the answers and that farmers should unquestioningly accept the staff's advice; (b) that farmers have the ability to figure out what is best for their own farms; or (c) that the research system does produce worthwhile adaptations

and innovations, but researchers can develop useful insights by listening to farmers (Lionberger and Gwin, 1982).

Because research reports generally are written in a scientific manner and do not relate closely to the needs of Extension field staff and their clientele, the information interpretation and processing function is critical (FAO, 1984). Training was provided to 10 Swaziland agricultural information staff members and other select individuals. Such went beyond the usual information skills associated with producing and distributing materials. The training included determining information needs; identifying authors and reviewers; selecting media formats and styles; providing graphic support for printed materials; reviewing and evaluating educational materials; and providing pedagogical skills for teaching information skills to others. In meshing this training with numerous discussions and planning sessions that interrelate information activities and extension objectives, the information officer was soon recognized as a valuable contributor in guiding broader educational programming decisions throughout the Ministry.

Developing an Information Processing System

The CSRET information component focuses on preparing the agricultural information section to assist the Ministry in establishing an effective agricultural information program. Central to accomplishing this was the design of a process for the flow of information from authors to the extension worker, and then to the farmer.

The information process centers around a word processing system readily available to potential authors/contributors. The Apple Macintosh computer system was chosen, primarily because of its user friendliness, flexibility to generate graphics, efficient word-processing, and its ability to set various sizes and styles of type. The Swazi staff have learned to type, edit copy, format and select type, set type, and generate graphics such as tables, charts, and illustrations. The staff has proven that these machines were excellent choices, because it has quickly learned to use them with reasonable effectiveness.

The computer system that emerged includes Macintosh Plus or equivalent computers located at the MOAC Information Section (4 units), the research station (2 units), the national subject matter specialists section (1 unit), and the Extension Training Section (1 unit). There also is a portable unit that is loaned out of the Information Section for use by other MOAC sections that wish to input into the system. Several CSRET Project personnel own Macintosh computers. Plus, the Apple MacLink software is used to convert IBM Microsoft Word documents for use by the information staff within the Macintosh system. Information staff are also resident experts in word processing on the Macintosh computer, providing training to appropriate staff within the system. Most tasks are accomplished on Microsoft Word, FullPaint, and MacDraw applications. A digitizing system (Thunderscan) is useful in supplementing the graphic art effort by enabling staff, who are untrained in art, to use this modern innovation to produce print support graphics.

As mentioned earlier, the CSRET project goal is to increase the economic viability of farming by developing and effectively extending cropping systems recommendations relevant to the needs of the Swazi farmer. To accomplish this, one of the primary thrusts of the information component is the production of appropriate publications as a support base of subject matter information. With authorship from among MOAC researchers, national subject matter specialists, Extension training staff, information staff, and others, many useful

Computer graphics are useful for producing publication covers with illustrations that depict the topic of the publication for easy selection by those with limited English reading ability.

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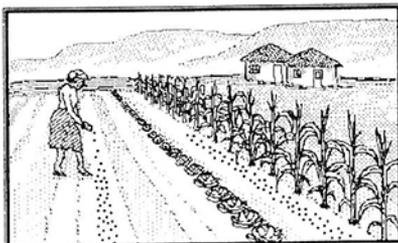
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and practical extension support publications have been edited, designed, and produced by the Information Section. These fall in three categories: fact sheets, production guides, and field support guides.

Publications typically are produced in English, and selected materials are translated into SiSwati, the native language. The system for developing extension support materials in Swaziland has evolved into the following:

a. *Audience*—The primary audience is often identified as the Extension field staff, with the SNL (Swazi Nation Land) farmer as the final target clientele. Much of this information also has application to commercial and other title deed farmers. It is becoming known that other audiences are making good use of these materials as well. These include national subject matter specialists, research staff, field staff of other ministeries, school teachers throughout the Kingdom, agri-business people, farmers who can read, and farmers who have others read these publications to them. These materials are also regularly used by farm broadcasters as resource materials for radio programs, for newspaper articles, and for support articles in the MOAC newsletter.

b. *Subject selection and identification*—Needed subject areas are suggested by frontline Extension field staff, regional Extension coordinators, Extension officers, national subject matter specialists, research staff, and others. With increased emphasis on planning Extension messages farther in advance, a more formal process has evolved for determining messages. This approach enhances the planning and production of educational support materials by identifying the topics early and providing the opportunity to generate these materials on a planned schedule. Publication priority is usually given to subjects that have been selected for messages. These typically relate to technologies with the greatest potential for improving agricultural productivity.

c. *Authorship*—Following the determination of needed educational materials, one or more authors are identified as having the responsibility for producing the initial manuscript. Researchers, NSMS, and others are encouraged to work cooperatively in developing this information. It is important to have all relevant persons (subject authorities) review each manuscript, or they may feel by-passed and hinder the acceptance of the new document.

In Swaziland, assistance is found beyond the MOAC research/extension systems with authorships from Swazibank officials (farm credit), the Seed Multiplication Project staff, University of Swaziland faculty, and specialists from a variety of other projects. The use of relevant information from neighboring countries also is encouraged.

The information and Extension training staff assist authors by keeping the manuscript focused on a reasonably narrow topic that fits with other publications that are either planned or have been produced. Some training is provided and authors are given examples of readable, low-tech writing that makes use of tables, charts, and illustrations, with the aim of generating information that is readable and understandable by the intended audience. After following this interactive process a time or two, authors dramatically improve the quality of their writing. They soon input better manuscripts, which require less time and effort, into the system.

d. *Editing, graphics, and layout*—If a manuscript is received as hard copy, the Information Section starts the word processing activity with the secretary entering the information into the computer. Increasingly, manuscripts are received as pre-entered Microsoft Word documents on a computer disk, reducing the demand upon the Information Section secretary. An editor then reviews the information on the computer, making editorial corrections in sentence structure and grammar, along with format and organizational changes that enhance the legibility of the information. These changes are based on proven principles of increasing the readability and comprehension of writing through logical organization, use of subtitles, word size, sentence length, line and paragraph length, letter size, style and boldness, the use of illustrations, white space, and other graphic treatment.

Typically, the information staff finds it necessary to check with the author(s) several times to approve changes, clear up certain technical points, or to have them provide additional information, photos, examples, or other supporting materials. If the editor feels that the manuscript is in need of considerable improvement, a preliminary draft is printed and given to the author(s) for additional work.

e. *Review and testing*—As the document nears completion, a layout/ pasteup is made and a number of "dummy copies" (photocopied publications) are constructed. Some of these are distributed to the author(s) for final review, and others are used to pretest the publication with an extension group. The information staff, extension training staff, national subject matter specialists, and others assist with the pretesting of these materials. These reviews and pretests are extremely helpful in identifying problems that a publication might have when used in a field situation. They help assure that the information is communicated in an understandable and useful manner.

f. *Final production*—Final copy is typeset in the Information Section on a LaserWriter Plus printer, with reproduction on an offset press. The CSRET Project has assisted the Ministry of Agriculture to build a self-contained print production facility because these services are extremely slow, of poor quality, and relatively expensive in the commercial sector in Swaziland.

g. *Distribution*—Training generally is linked to the distribution of Swaziland extension publications. Information contained in the publication is explained and practical exercises are provided to the field staff by the Extension Training Section.

Supplies of many publications are readily exhausted even though their distribution is carefully monitored. Reprinting is often necessary within two to three months of original production. Comments on extension field staff evaluations pay particular tribute to the readability and practicality of the publications and visual materials produced.

h. *Growing support*—Researchers, national subject matter specialists, and others are recognizing the merits of the growing information system that is now underway. They are generating a good flow of useful and practical information to be processed and packaged for use by the extension worker to assist the SNL farmer to increase productivity. At the beginning of the project it was difficult to find anyone willing to contribute time and energy toward writing manuscript. There are, currently, nearly three dozen publications in various stages of editing and production.

The educational information that is developed for these publications is spinning off useful articles for the MOAC newsletter and local newspapers. This inspires the development of visual support materials, and serves as a resource for radio programs for the farm broadcasters.

Improving Field Staff Effectiveness

Information transfer in an Extension system largely depends on the ability of Extension staff to understand, then to successfully motivate and teach farmers to accept and implement recommendations. In addition to providing appropriate media support, Swaziland information personnel assist field staff to acquire and use effective communications skills. Cooperation and teamwork among research, information and Extension personnel become very important to Extension training—one of the best methods to increase field staff effectiveness.

1. Researchers and national subject matter specialists (NSMS) contribute by supplying background information to insure that all Extension staff share an understanding of the relevant subject matter principles. They also provide technical updates as recommendations evolve from current research relating the subject matter to current growing conditions and the socio-economic constraints faced by farmers.

2. Information officers provide Extension field staff with training in communications theory and skills to increase their individual communications abilities and teaching effectiveness. It was found that Swazi Extension staff had little or no training in organizing a presentation, in speaking before groups, in preparing teaching aids, or other communications skill areas. This was also true of the researchers and NSMS who appreciate receiving this training as they can more effectively deliver their presentations. Information staff assist by providing instruction to researchers and NSMS in writing/editing skills, word processing, presentation skills, graphic communications, evaluation and feedback, and by assisting with the development of creative and effective ways of getting messages to the audiences.

3. Extension training staff provide training in teaching methods. They also assist with coordinating and integrating communications theory and skills, educational methodology and technical subject matter training. They assist

with planning, organizing and coordinating educational programs, developing individual lessons or messages and in applying various extension teaching methods. They are instrumental in the evaluation of educational materials and programs.

The Swaziland Information Section is gaining acceptance and support from the leadership in the Ministry as they discover the quality of products and services it provides. This information system has been viewed with interest by officials from numerous other African countries. Details of this interactive process as well as specifications on the computer hardware, software, and the printing equipment have been requested and shared with many of them.

Summary

A comprehensive communications/information unit cannot be isolated from the other components of the institution which it serves. To be most effective, staff members must be involved in a variety of activities that go beyond the mere production of information support materials (Ray, 1985). In the Swaziland Ministry of Agriculture and Cooperatives, information staff participate in overall planning, provide individual consultation, perform teaching/training functions, produce and evaluate educational materials, and provide information support services. These activities are just as relevant to technology transfer in the United States as in a developing country.

The necessity for the information staff to interact with researchers, national subject matter specialists, Extension training staff, extension officers, extension field staff, and others cannot be over-emphasized. All parties must recognize that the real payoff is in the acceptance and utilization of the technical innovations rather than the research findings themselves. Efficient and effective information transfer can best be accomplished through a combined effort where everyone understands and contributes to the process. This process must encourage information flow in both directions to insure the usefulness of the information.

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