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AUTHOR Donoghue, Beverly Emerson
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ABSTRACT

An innovative educational medium--screenprinted visual aids on cloth--is one alternative to conventional media in Africa, where visual materials are important communication tools but conventional media and materials are often scarce. A production process for cloth visual aids was developed and evaluated in Ghana and Sudan through the implementation of several experimental projects. Unlike paper and electric/electronic visual media, cloth is familiar and can be locally produced with unskilled labor. Results indicate a preference for this type of cloth-based visual aid over conventional paper ones, and printing was found to be economically feasible if done on a mass-production basis. Since 1972, economic and political stability in Ghana have deteriorated, producing a more urgent need for locally developed products. A feasibility study conducted in 1980 found cloth in short supply but need for visual materials large; however, for educational purposes, a supply of cloth could be provided. In Sudan, the development of textile visual aids is more advanced, with all materials needed locally available. The approach is significant in that, instead of transplanting a Western communications medium, the strategy takes advantage of local materials and resources. (LMM)

TEXTILE VISUAL MATERIALS:

APPROPRIATE TECHNOLOGY IN ACTION

Beverly Emerson Donoghue

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"While others try to reach the moon,

we must aim to reach the village."

Julius K. Nyere

TEXTILE VISUAL MATERIALS:
APPROPRIATE TECHNOLOGY IN ACTION

Visual materials are important tools for communication, education, and training programs in Africa. Conventional media and materials, however, are often scarce because of the reliance on imported supplies, technologies, and personnel from the developed countries. This paper will examine an innovative educational medium--screenprinted visual aids on cloth--that was first developed in Ghana. A brief analysis of the African setting, the rationale for textile visual materials, a description of the production process, and research and development efforts in Ghana and the Sudan will be described. Recommendations for educational technology applications in developing countries will also be presented.

Introduction to the African Setting

Located on the west coast of Africa, Ghana is about the size of Oregon, and has a population of 11 million. Although many people reside in cities, the majority of the population lives in rural areas--along the coastal plain, in forest regions, and in dry savannah and desert-like terrain. The primary occupation throughout the country is subsistence farming, although the nation's foreign exchange earnings are mainly from cash crops of cocoa and timber.

A former British colony, Ghana's official language is English. There are, however, over 55 different ethnic groups in the country, each with its own language or dialect. As in most African countries, literacy levels are quite low--about 30% in Ghana. Since becoming independent in 1957, one of the government's major tasks has been to expand primary education in order to make it available to all children in the rapidly increasing population. As much as one-fourth or one-third of the annual budget is devoted to expanding and

improving the educational system. Extension or nonformal education programs --in agriculture, literacy, health, family planning, community development-- have also increased dramatically as government ministries and private organizations have attempted to raise the standard of living of the largely rural, illiterate, and linguistically diverse population.

With such tremendous communications and learning needs, what visual materials, then, are available in Ghana and other African countries? Printed materials are in short supply because, with very few paper production facilities in Africa, almost all paper must be imported and is very expensive. Thus, most institutions and agencies have access to a very limited supply of paper which cannot possible meet the needs of a rapidly growing population and educational system. A sheet of paper is truly a luxury in most rural areas.

The situation regarding electric and electronic visual media is also dismal: at the present time, all of the equipment must be imported. The cost of the hardware alone is prohibitive in terms of scarce foreign exchange. Software development is limited because of a dependence on imported film supplies and camera equipment. There are few or no spare parts, a shortage of trained personnel for maintaining and repairing the equipment, and an unreliable or non-existent electricity supply in rural areas. The most practical projectors available at this time are the small battery-operated filmstrip and slide projectors, costing between $50 and $125. These also represent a sizeable foreign exchange investment for large-scale programs, but at least they are lightweight, durable, and they work--even in the most remote areas.

The dilemma regarding conventional materials and media can perhaps best be illustrated by three situations in which I was working as a Peace Corps Volunteer for 2 years. First, as a materials and media specialist at a university, I had access to graphic supplies, photographic facilities and exper-

tise, a slide projector (complete with spare bulbs), and a fairly reliable electricity supply. In this instance, it was possible to both develop large illustrations on paper and make color slides from artwork for use in various classes.

At a nurses' training college in the same city, the resources were much more limited: a projector without a bulb (which had been requested over a year earlier), an unreliable electricity supply, and no graphic supplies or photographic equipment/facilities. The visual materials "solution" was to paint illustrations for teaching/learning on large plywood sheets for use in the different courses. Although an oddity at first, these life-size murals on wood became very popular with both nursing tutors and their students.

The real nightmare for a materials and media specialist was at the level of the primary schools and extension programs. With such large-scale learning and communication needs, neither printed paper visual aids or electric/electronic visual media was either technically feasible or affordable--except for the few "cadillac" programs that received external funding or imported supplies from international aid agencies. The challenge was to look more closely at the available resources, seeking alternative communications media that were practical, affordable, and culturally relevant for both formal and non-formal education programs.

The Rationale for Textile Visual Materials

Unlike paper and electric/electronic visual media, cloth is a familiar and colorful sight in both urban and rural areas of Africa. Everyday scenes of children caring for young ones, fisherfolk bringing in their catch, market women selling their wares--each is accented by colorful cotton prints that are manufactured locally.

While there are no paper production facilities in Ghana, there are several

well-established textile factories that weave and print intricate designs in bright colors. Printing facilities vary from large automated factories to small cottage industries.

Throughout the continent, there is a strong tradition of textile artisans, who often create striking fabric designs with the simplest tools. Today village textile industries abound: weaving, stamping, cassava resist or batik, and tiedyeing are some of the many techniques used, employing both imported dyes and those derived from local plants, trees, and minerals.

Cloth is a very durable material, and, unlike paper, will last a long time--despite the temperature and humidity extremes of Africa's wet and dry seasons. Whereas paper is "imported" both from other countries and from the city, cloth is a familiar commodity, and as such is much more "touchable" or "approachable" than paper. Cloth can easily be washed when soiled, and readily folded up and carried from village to village. People wear fabric, wrap their babies in it, and use it to carry all kinds of things. So why not let cloth carry educational messages as well!

In fact, several African countries have had fabric printed to illustrate and thus promote slogans for national campaigns--such as "Operation Feed Yourself" in Ghana and "Healthful Foods" in Tanzania. When worn, these brightly colored designs become walking posters for everyone to see. The use of printed cloth designs as visual communication tools simply carries the textile medium one step further.

The Production Process

The simplest method for printing large designs on cloth is silkscreen printing. The actual stencil is a very fine mesh screen fabric stretched tightly across a rectangular wooden frame. Open spaces in the screen are the design areas to be printed, with the rest of the screen sealed to prevent

ink from passing through.

The basic equipment--screen frame, printing blade, and long printing table--are constructed mainly from wood. Local materials can satisfy most, if not all, printing supply needs. Most of the labor can be performed by unskilled workers, who can be given on-the-job training in manual screen-printing methods. The labor-intensive printing process is particularly appropriate for developing countries, whose greatest potential resource is the large pool of untrained and under- or unemployed workers.

The production sequence for textile screenprinting is as follows:

1. A design is created, based on specific behavioral objectives and learner characteristics.
2. The design is pre-tested by extension workers or teachers to ensure that the visual message is clear, acceptable, and culturally relevant.
3. After the design is revised, each color is transferred onto a separate screen. This can be done several ways--using stencils made from paper, lacquer, knife-cut film, or light-sensitive emulsion. The method used will depend upon the available supplies, the complexity of the design, and the number of prints or copies needed.
4. The design is then screenprinted on cloth: when dyepaste is pushed across the screen with a rubber blade, the paste goes through only the open parts of the screen stencil onto the cloth below.
5. After printing all of the colors, the printed cloth is removed and dried in the sun, usually followed by ironing to help bind the dye or pigment to the cloth.

Research and Development Efforts with Textile Visual Materials

Because the printed cloth medium seemed to be such a natural one for the African setting, a prototype development project was organized in Ghana in

1974 to test the technical feasibility of printing large educational designs on cloth, to find out how acceptable the cloth medium would be to educators and extension personnel, and to determine the production costs involved. With the assistance of private educational organizations, private industry, and government agencies, Ghanaian art students designed and printed on cloth 4-color illustrations of a variety of subjects, including the eye, the digestive system, and a physical map of Africa. The periodic chart of the elements and the life cycle of schistosomiasis (bilharzia) were also printed. These 3 foot by 5 foot illustrations were presented at several national and international conferences and distributed to educators from various African countries. The response was a unanimous preference for this type of cloth-based visual aid over conventional paper ones. Teachers were delighted to see for the first time educational designs depicting Africans rather than Europeans--indicating that the few visual aids used in the schools were imported and irrelevant for the learning needs and African cultural setting. The most frequently-heard comments expressed by teachers and extension workers were feelings of pride and delight that these vivid illustrations were produced by Africans, for Africans, and on African soil. Printed cloth designs were seen as one of the few communications media that could in fact "reach the village."

As with most printing processes, silkscreen printing was found to be most feasible economically if done on a mass-production basis. Based on a minimum order of 4,000 yards, or 2,400 copies of a 3 foot by 5 foot design, preliminary cost estimates made in Ghana in 1974 indicated that these large 4-color illustrations could be screenprinted on cloth for less than U.S.$3.00 each. Because cloth was readily available locally and because the cost of imported inks and stencil materials was only a tiny fraction of the overall cost of materials, this production figure was considered quite reasonable.

If the amount of foreign exchange being spent on imported paper and imported visual aids was used for printing inks instead, local industry could produce more and better visual aids at lower actual cost.

Since 1974, both the economy and political stability of Ghana have deteriorated considerably. With frequent shortages of all kinds of goods, there is an even more urgent need to develop products from local materials. Accordingly, an in-depth feasibility study was conducted in Ghana during the Textile Visual Aids Project in 1980, which was jointly sponsored by the Ghana government and the U.S. Agency for International Development. The purpose of the study was to determine the availability of necessary supplies; to assess the existing and potential demand for visual materials on cloth; to update production costs; and, if found to be feasible, to recommend organizational options for the development and production of textile visual aids.

Cloth was indeed found to be in short supply. Although cotton-growing is one of the agricultural priorities of the government, most raw cotton fiber must still be imported. Because it would be used for educational purposes, however, an adequate supply could be guaranteed by one or more textile manufacturers. Printing inks were still imported, but some highly successful experiments were conducted, substituting cassava paste for the imported printing binder. It was also found that UNESCO coupons could be used for ordering up to $20,000 worth of imported supplies, more than would be needed to supply a textile production unit with printing ink for two and a half years. For each 2 foot by 3 foot cloth print used in a school or extension program, the foreign exchange cost would be about $.11.

The visual materials needs of various sectors was quite large. There are over 7,000 primary schools and over 4,000 middle schools in Ghana. The Ministry of Health would like to print at least 5,000 copies of designs on

several topics. The Home Extension Unit of the Ministry of Agriculture, the Ghana National Family Planning Program, and the Mass Literacy Campaign by the Department of Social Welfare and Community Development are other nation-wide extension programs which need durable visual materials. Because of the durability of cloth, agency officials gave $3.66 to $5.50 as a reasonable price range for each textile print.

Production costs were determined for private textile printing factories and for a production unit to be based at a specialist training college with printing facilities. With a minimum order of 1,000 prints, the cost per print from a private textile firm would be $2,28. If done by the production unit, the cost would vary from $1.86 to $2.74 each, depending upon the quality of cloth used for printing. This is well below the acceptable price range.

Because of the present shortages of cotton cloth, a private company cannot produce textile visual materials on a continuing basis at this time. A production unit attached to an educational institution, however, would be able to receive a guaranteed supply of cloth. A specialist training college in a small town hosted the Textile Visual Aids Workshop, providing facilities and a counterpart/production manager. A production unit there would offer valuable training to the textiles students, while producing not only attractive but useful textile designs. In addition, channeling resources out of the capital and other large cities and into a rural institution not only makes use of existing facilities but supports the stated government policy of encouraging rural development.

The 10-week workshop on Textile Visual Aids was provided for representatives from various ministries--education, agriculture, health, information--and organizations associated with nonformal education and family planning. Participants included not only artists, but also extension workers, a secre-

tary, an administrator, a curriculum specialist/trainer, a non-formal education facilitator, and textile printing instructors. Working in small groups, participants designed and printed visual aids on cloth for their respective programs. In addition to experimenting with the cassava-based ink, the group also began experiments with local dyes for substituting for imported dyes and pigments. Although not as washable as the imported ones, the local dyes deserve systematic research. Even when they are not wash-fast or light-fast, local dyes printed on cloth are more durable than any of the paper or cardboard-based visual materials.

The designs developed by workshop participants included the following topics: raising rabbits for food, eating a balanced diet, making oral rehydration fluid, preventing diarrhea, family planning (one directed at women, another directed at men), and village scenes for language learning in primary schools. The various ministries were quite pleased both by the quality of designs developed and by the use of cloth as a communications medium. Because several ministries have overlapping needs, it was recommended that the textile visual materials production unit as proposed be a collaborative effort of interested institutions. This would prevent duplication of visual messages, and, thus, unnecessary expense, and promote production and use of cloth-based visual materials in a wide range of programs.

In the Sudan, the development of textile visual aids is even more advanced. The abundance and low cost of cotton there make it a very appropriate visual communications tool. All of the materials needed are locally available, including the following innovative adaptations:

--gelatin glue for preparing the screen stencils

--women's veil material for the screen fabric

--sorghum starch and direct dyestuffs to make the dyepaste/ink

Plans are now underway for the World Health Organization and the Ministry of Health to establish a rural production center in the Sudan for printing textile visual messages for health education programs. It is possible that, once established, the production center may evolve into an income-generating operation for the village--printing cloth designs for the many extension programs in the country.

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Textile visual materials are not offered as a panacea for the urgent communication and educational needs in Africa. Visual aids are clearly very helpful, particularly when combined with radio discussion groups and other participatory media. What is significant, though, is the approach: rather than trying to transplant a communications medium from the West, the strategy has been to take advantage of the materials and resources that are available locally--to experiment--so that communications tools will be relevant for the local resources, learning needs, and cultural setting in African countries.

For further information on the development and feasibility of textile visual materials, please contact Beverly Emerson Donoghue
1118A West Tenth Street
Austin, Texas 78703
(512) 478-6785 or 477-1130

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