EDUCATIONAL NEEDS FOR RIGID PAVEMENT CONSTRUCTION*

The process of education is essentially the passing on of thoughts from one person to another and hence is largely a process of communications. These communications may be verbal, written, graphical, or by demonstration. The purpose of a communication may be to serve one of three things:

1. To pass on information;
2. To convince the other person; or
3. To instruct a person how to do something.

The educational needs for construction of better rigid pavements involves all three of these types of communications.

COMMUNICATION OF NEW INFORMATION

As new techniques for building of pavements are tried and found satisfactory, as new machinery is developed, and as new knowledge is developed on the proper handling and processing of materials to build pavements, it is important that information on these new developments be passed on to people who can put the ideas to work.

Through such organizations as the Portland Cement Association, the American Concrete Paving Association, the American Association of State Highway Officials, and manufacturers of construction equipment, much information on new machines and new developments is made available. There is need, however, not only for information that something has been tried and found to work, but also that an evaluation has been made of how well it worked and how economically it may be employed. Many such evaluations have been made and are being made by the various state highway departments, by universities, and by private organizations. Much study is being carried on under the Highway Research Board-administered National Cooperative Highway Research Program. An important need exists for publication of such findings in such a manner that the new information will reach the potential user—the highway construction contractor. Some of this communication of information is done through trade journals and magazines, but more of it could be done through construction-oriented organizations such as the Associated General Contractors, the American Road Builders' Association, and the American Concrete Paving Association. Publications of articles in trade journals as well as papers on programs of national meetings are effective, if they reach the men who can really use the information.

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*This article takes a look at the changing picture in portland cement concrete pavement construction practices and offers some suggestions on needed programs of continuing education and training. It was prepared by a subcommittee of the HRB Department of Materials and Construction's Committee on Construction Practices—Rigid Pavement (MC-C1) comprised of Harold J. Halm of the American Concrete Paving Association and Professor Emmett H. Karrer of The Ohio State University.

COMMUNICATION TO CONVINCE PEOPLE TO DO SOMETHING

In the second category of communications, convincing people to do something or convincing them that something they are doing needs to be changed, one of the greatest needs in education for concrete pavement construction is that of convincing the specification writers for departments of highways that new machines and new techniques can and should be allowed to be used. The most persuasive arguments are, of course, examples of things that have been tried and found worthwhile.

The Highway Research Board could render a very valuable service in this field of communications if it would present the results of studies and observations of new techniques and the performance of new machines to highway administrators in such a manner that the new knowledge could be used immediately in specifications for construction projects. Such communications need to be complete, clear, well-documented, and free from multitudinous extraneous data.

COMMUNICATIONS AS A TOOL FOR TEACHING OF A SKILL

In portland cement concrete pavement construction there are many levels of knowledge and skills required. These range all the way from the skill of laborers in performing their assigned tasks, the ability of machine operators to get maximum production at lowest cost from their machine, the skill of foremen in directing the work of their crews, the ability of the project supervisor to keep the project on schedule, to the ability of the top management to keep their equipment and manpower continuously productive with an adequate margin of profit. Consequently, many kinds of teaching are needed.

At the top level, in our competitive-bid, private-contract system of construction, there is urgent need for better ability in contractors' top management. Today a single spread of concrete paving equipment may cost a million dollars or more, so the contractor is in big business. He can improve his management ability by participating in or by sending his key staff men to attend short courses and seminars in top management, data processing, cost accounting, use of CPM, etc. Such offerings in continuing education for management of engineering construction are now available at many universities.

At the next level of the kind of thinking needed for construction management, we might place the field supervisors. The supervisor must manage machines, materials, and men. It is essential that the supervisory personnel of a contractor's organization be thoroughly familiar with all of the capabilities and limitations and service requirements of the machines that will be on each project. The supervisors must understand the characteristics of and the processes to be followed in handling of all of the materials, and the details of all tests that are to be made to verify quality of materials. He must be able to recognize the needs, when they occur, for adjustments in equipment, procedures, or mix design to remedy problem areas and produce a quality pavement. He must be able to organize, direct, and motivate men. Here again opportunities for continuing education are available in many states, usually under the direction of some university with the cooperation of contractors' associations.

The contractor's supervisory personnel must, in turn, educate or train the foremen and laborers to do their parts in the procedures to be followed. Laborers, and especially machine operators, must be made aware that when they lose one minute in a key operation, the whole million-dollar outfit is unproductive for that length of time. It is important that all of the contractor's personnel understand the whys and wherefores of what they are doing and that they be made to feel a part of the team. Such education or training can best be provided through in-service training courses. They may be conducted by the

contractor for his own personnel, perhaps taking advantage of winter months or slack construction seasons, or they may be conducted for groups of employees by contractors' associations with the help of competent teachers. The fact should not be overlooked that teaching is an art and that the professional teacher has learned many techniques of communications, often using visual aids and reading assignments to augment his oral presentation.

TEACHING AIDS

Such agencies as CIMA (the Construction Industry Manufacturers Association) and the Portland Cement Association can be helpful in furnishing literature, slides, movie films, and other teaching aids. Although much literature and many movies are available from equipment manufacturers, unfortunately some of these are based on the hard-sell method containing so much propaganda that they lose their effectiveness as a teaching aid. It is hoped that perhaps CIMA may develop some needed teaching aids in the form of bulletins, film strips, and movies with the appropriate soft sell of recognition of the producer of the item.

The Portland Cement Association (PCA) is currently working with the Department of Health, Education, and Welfare to develop a 2-year curriculum and materials for training workers in concrete technology and various job classifications.

The activities of PCA are in conjunction with National Ready Mix Concrete Association and the American Concrete Institute. The program is set up in three phases. Phase I is intended:

(1) "to provide course content and teaching guides for an area of vocational education where no such training now exists";
(2) "to broaden employment opportunities in an expanding industry for 'non-academic' post high school youth";
(3) "to provide a basis for in-service job upgrading and other adult vocational education programs";
(4) "to reduce a critical shortage of skilled manpower in the growing cement and concrete industries";
(5) "to provide new avenues of employment for persons from socially or economicaly disadvantaged groups";
(6) "to initiate vocational education training programs to fill the manpower needs of the cement and concrete industries."

This is the first of a three-phase program. Phase II is to be a 2-year pilot program to provide through field test the level of training for which the basic curriculum (Phase I) is designed.

Adaptation of curriculum materials developed in Phase I for other levels of vocational education and for training programs for specific occupations will be accomplished in Phase III.

Thus, vocational educators will have available a complete, field-tested curriculum for a 2-year course in concrete technology, plus curriculum materials and teaching outlines designed specifically for programs in adult continuing education, high school vocational education, apprentice entry, on-the-job training, and training or retraining for specific job skills.

At the present time this particular material is being directed toward techniques in masonry and floor construction. It does not appear to be adaptable to highway pavement contractors. However, the basic materials could be related to the industry or a similar program could be set up specifically for portland cement concrete highway construction.

COMMUNICATIONS FOR BETTER WORK RELATIONS

Another kind of teaching needed is within the state highway departments where project engineers and inspectors are not always as familiar as they should be with the capabilities and characteristics of machines that will be used on their projects, and with all of the new specifications and testing procedures that are to be followed. A cost of construction that is becoming ever more serious, dollar-wise, is that of time lost by a contractor waiting for an inspector to make a test before giving his approval to go ahead.

Many state highway departments conduct winter schools for their summer construction inspection personnel. National and state organizations concerned with quality rigid pavement construction might do well to furnish speakers loaded with factual ammunition on the contractor's need for minimizing of delay in construction due to inspection procedures.

SUMMARY

It is said that our published knowledge in engineering is increasing at such a rate that it is doubling about every 10 years. The ceremony marking the completion of high school or college is called "commencement" and it is essential that everyone, to be successful, must continue his education. A tried and most successful means of education, or communication of thoughts, is that of the teacher-pupil relationship in a classroom setting.

There are needs for several kinds of efforts in continuing education for better building of portland cement concrete pavements. Better management at the top, better supervision, better operation of equipment, better specifications, and better inspection can all be obtained through continuing education.