A Third Dimension: The Future of Educational Technology in Industry

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ABSTRACT: Educational technology has had a significant influence on the field of training in business and industry; the greatest impact has been upon the analysis phase of course development. Need, task, and target population analyses are used more and more to define course content. Five improvements are needed, however, if educational technology is to further its influence on business and industry training: (a) course development time must be shortened without adversely affecting course quality; (b) subject matter experts must be used more effectively; (c) educational technology techniques must be applied in the field of management development; (d) the scope of educational technology must be expanded to include the maintenance of behavior; and (e) greater attention must be given to the differences between the adult learners found in business and industry and learners in other age-group settings. Cooperation between trainers in the private sector and academicians will be required if major advances are to be made in these areas.

In recent issues of the *Journal of Instructional Development*, the future of educational technology has been discussed and debated by those in the academic world who are concerned with its future. In each of the major articles published to date, concern has been expressed about the place of educational technology in the world outside of academia. Gustafson (1978) is concerned that the field of educational technology is not getting enough input from the outside world. Silber (1978) takes a more optimistic approach and sees this isolationism as a problem that can be solved by expanding the target audience of educational technology from higher education to business, industry, medical education, and special education. Boutwell (1979), after analyzing the instructional systems development approach in some detail, concludes that the methods with which educational technology began failed to adapt themselves quickly enough to the changing environment.

It is clear from these articles that the future of educational technology depends, at least to some extent, on increasing the interaction and breaking down the barriers that often exist between academy and business and industry. To increase interaction and break down these barriers will take some effort by both sides. Those of us in business and industry can help by contributing to a greater degree to the literature concerned with educational technology and by participating in the more academically oriented societies such as the Association for Educational Communications and Technology (AECT).

The purpose of this article is to start to break down these barriers and, at the same time, spark more discussion of the future of educational technology.

The Impact of Educational Technology on Business and Industry

The impact of educational technology on business and industry, especially in the area of technical and skills training, has been tremendous. A quick review of the changes that have occurred over the past decade makes this quite apparent. Not too many years ago, the content of many courses was determined more by what the instructor had been taught and what the instructor knew about the subject matter than what the students needed to learn to do the job. Today, the content of most technical and skills courses is based on instructional objectives derived from a task analysis. The strategies used to present courses are no longer limited to the old standbys: lecture, on-the-job training, or vestibule. Today, these methods, plus numerous others (including many forms of individualized and learner controlled methods) are used. Evaluation of training programs no longer consists only of a questionnaire at the conclusion of the course to determine the students' attitudes. Industrial trainers are now putting more and more effort into the evaluation of their course. The techniques and methods used to evaluate the effectiveness of courses are many and varied, but they are all aimed at ensuring that the courses are not only well received, but also teach what they purport to teach.

Today's training specialist seldom develops a training program simply because it is requested. After receiving a request to develop a training program, a performance analysis is usually conducted to determine the need for the appropriateness of training as a solution to the perceived problem. Then, if necessary, a training program is developed. If training is not the proper solution, alternatives are usually presented to the requester. This is not to say that unnecessary training programs are not developed because it is *politically* necessary at times. But at least these concessions are made consciously. Perhaps the greatest impact has come not from educational technology alone but from the combination of educational technology and behavior management. Training departments that combine these two technologies in a systematic manner, such as that espoused by Gilbert (1978), find themselves expanding both their role and their effectiveness within the organization. These departments no longer offer their customers only training courses. They offer assistance in analyzing performance problems and

implementing nontraining solutions such as job aids, feedback systems, changes in job structure, and improved selection processes, to name but a few. While educational technology has brought about many changes within business and industry, there is much to be done. There are five areas that, if attacked vigorously, could lead to major advances in our ability to improve performance.

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Shortened Development Periods

First, the time required to develop courses must be shortened without adversely affecting the quality of the finished product. The length of time required for course development may be the biggest stumbling block in getting business and industry fully to accept and use all that educational technology has to offer. Today, many training departments follow a general model of course development like those described by Mager (1974) and Hinrichs (1976), but few implement the model to its fullest extent.

Training program planners do recognize the savings to be realized from shortened presentation times and more efficient on-the-job performance by properly trained employees. Published reports such as Short (1973) and Shoemaker (1976) as well as unpublished, proprietary data attest to the savings. In many cases, companies have obtained savings by doing little more than following a course development process that only superficially approximates an educational technology model.

The process used by most companies consists of some form of needs analysis, followed by a task analysis that seldom goes beyond the determination of the tasks and major elements of each job. Included as part of the needs analysis is usually some form of target population analysis. Using the output of these analyses, objective and prerequisite learning lists are prepared. At this point, adherence to the model deteriorates even further. Materials are developed and teaching methods are selected based often on personal preferences, or worse, on what is fancy or flashy rather than on what is effective. Even greater savings could be realized in many cases by closer adherence to a good educational development model.

An in-depth task analysis could result in further reduction of the quantity of material taught, in improved job aids, and in more efficient methods of job performance. Selection and use of appropriate teaching methods and strategies could improve both retention and mastery of the subject matter as well as possibly reduce the learning time.

Why, then, don't training departments expend the time and effort required? There are probably two major reasons. The first is cost. The increased time spent developing courses is almost always reflected in the training department's budget, but the ultimate savings obtained by improving course development (and often that savings cannot be delineated) is seldom reflected totally in the budget of the training department. When this is the case, it may still be possible to obtain needed funds by showing senior management the overall savings to the company. Far too often, the savings cannot be shown because the training is taking place in a dynamic situation where any number of changes or activities may have brought about the savings. In other cases, the savings cannot be shown because, in effect, the training presented an increase in expenditures.

The second, and more important, reason training departments do not expend the time and effort to develop more efficient courses is that the training program is needed immediately, not 6 months later. The technology in many industries is changing rapidly and the rapid change means that the lifetime of a training program is relatively short. The lead time to develop a course is dictated by conditions outside of the training department, such as the time from when information on new products becomes available to the time when a course must be available for use.

Using Subject Matter Experts as Educational Developers

The second challenge is the need to develop a better means to use subject matter experts (SME's) as educational developers. In fields such as telecommunication and computers, not only is the technology changing rapidly, but the subject matter is very complex. The combination of a short time-frame for course development and the complex tasks that must be taught to the students usually precludes using educational technologists as course developers. To get around this, SME's are often trained in course development techniques. The converted SME usually remains far more interested in the original field of expertise than in educational technology. They see task analysis and objective writing as a waste of time. "It might be all right for simple subject matter but not for the things we teach," is the attitude often exhibited. The simple subject matter they developed in educational technology courses cannot be easily related to the complex troubleshooting and other analytical activities that they are asked to teach. They may give lip service to their new course development skills, but the methodology they follow has little resemblance to what they have been taught.

When the SME-turned-educational-technologist does try to use the model taught in the educational technology course attended, it quite often does not work. As Boutwell (1979) pointed out, the models that we use are still a long way from being refined sufficiently to permit formulation of course design rules that fit every situation. Yet, it is in these areas that the rigorous application of educational technology could have the greatest payoff. Tremendous sums are spent each year training people to troubleshoot and maintain complex telecommunication and computer systems. Yet few of those trained ever become anything more than just barely adequate at their jobs. Considering the number of people in these jobs and the savings to be obtained, it should be worth finding a means of solving this problem. Two solutions are readily apparent. Find more effective ways to convert SME's into educational technologists, or improve the educational technologist's ability to interface with SME's. Both of these alternatives have been tried with limited success.

Management Training

The third challenge is to infiltrate the world of supervisory and management training to a greater degree. Even in companies that have a strong commitment to educational technology, the management training groups seem to be exempt from even pretending to develop courses based on a task analysis or designing courses to meet measurable objectives. In a few cases, instructionally sound programs are developed for first-line supervisors but almost never for middle- and upper-level management. Yet, here again, we have an area where the cost of training is high, especially if the salaries of the students are included in the cost, as well they should be. But apparent cost should not be a restricting factor. The results that could be obtained from identifying training needs and then bringing about the desired changes in manager behavior are probably greater than those that could be obtained from the same allocation of resources to any other single group of individuals. Well trained, effective managers cannot help but produce more efficient, effective organizations. According to Rader (1979), one of the principal factors affecting productivity in the United States is the quality of management.

Maintenance of Behavior

The fourth challenge is to expand the scope of educational technology to include not only the development, implementation, and evaluation of programs but also the maintenance of the desired behavior. Far too often, training programs are developed and implemented at great expense; yet the results obtained are negligible. This often occurs because the work environment does not support proper performance on the job. People are not given feedback, or the feedback that is given is inappropriate. Job aids that should be available are not; tools are in poor condition; the performance workers are trained to give is not the performance actually rewarded.

While line management and training may appear to have two different functions, there is a considerable amount of crossover. Line management is responsible not only for the conditions that exist in the work place but is also responsible for training. Because of the complexity of the training function, there are staff groups to provide line management with training programs. Logical extension of the training function would be to assist line management to develop and maintain a work place that supports the desired behavior or performance. No group is better prepared to assume this function than the educational technologist in the industrial training department.

This challenge certainly is not new. In 1973, Brethower discussed the need for maintenance systems. At that time, she felt that those responsible for developing training programs, particularly self-instructional ones, would also have to design maintenance systems. Others have also discussed the topic, but more often than not, under the guise of performance analysis (Mager, 1970) or front-end analysis (Harless, 1970). Gilbert (1978) has taken the whole concept a step further. He suggests that we become performance engineers. In this case, educational technology is just one of many tools in our bag. Still, most colleges, educational technology programs, and training departments ignore all behavior-change methods except training.

Adult Learners

The final challenge must be met before any of the other changes can be brought about. This final challenge is to pay more attention to the adult learner. More research should be done to investigate the characteristics that differentiate the adult learner, especially those in business and industry, from other learners, Howe (1977) and Knowles (1977) have done quite a bit to enlighten us about adults in general, but little research of business/industry groups has been performed. The research that has been done deals more with those in management or professional positions than with those who are semi-skilled. Once the characteristics of adult learners have been differentiated from those of other learners, curricula should be changed accordingly.

Meeting these challenges will take the combined efforts of academia and business and industry. The former must continue to search out and work with those in business and industry who are interested in the future of educational technology. Those of us in business and industry must work to expand our numbers and to provide greater opportunity for research and experimentation in applied settings. Without this, the theories remain untested hypotheses which we must select, reformulate, and adapt to each new situation.

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