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SHOULD WE TRAIN APPLIED BEHAVIOR ANALYSTS TO BE RESEARCHERS?

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Should we continue the tradition of training nearly all our masters and doctoral students to be research scientists, or should we provide different training for those who wish to be practitioners? In searching for an answer to this question, the present paper involves informal use of two general approaches of behavioral systems analysis: front-end analysis and feasibility analysis.

BEHAVIORAL SYSTEMS ANALYSIS

To do a behavioral systems analysis, the practitioner should systematically perform the following steps: Do a front-end analysis of the behavioral system. Specify the goals of the system. Design the system. Implement it. Evaluate it. And recycle through the preceding steps until the goals are obtained (Malott, 1974; Mechner & Cook, 1988; Redmon, 1991).

> [In a behavioral system] the principal components are organisms, usually human beings, working together to accomplish some set of ultimate goals or objectives. Organizations are behavioral systems—for example, a factory, a hospital, a school, a city government. But there are some behavioral systems that, by convention, we do not usually call organizations—for example, on a large scale, an entire country; on an intermediate scale, a department or division of an organization; on a smaller scale, a family; and on a tiny scale, we may consider individual people as behavioral systems, though not as organizations. In this latter case, the system's components might consist of various tasks the individual does. (Malott & Garcia, 1987, p. 128)

We do the front-end analysis before designing and implementing our intervention. It includes a goal analysis and a task analysis. The goal analysis helps us select the goals for our system (Mager, 1984; Malott & Garcia, 1987). Therefore, in designing an instructional system to train applied behavior analysts, our goal analysis might involve both a market analysis and a needs analysis. Furthermore, Malott and Garcia (1987) argued that all systems should have the well-being of humanity as their ultimate goal and that intermediate goals should be selected so that they lead to the ultimate goal. This suggests that in our goal analysis we should consider formally the relation between our training of behavior analysts and the needs of humanity; we should not take that relation for granted.

Recently, several behavior analysts have suggested, either directly or indirectly, that we include a market analysis when we do a front-end analysis to insure that people will use our products once we have produced them. Geller (1991a) pointed to the importance of market analysis by noting that W. Edwards Deming, credited with revolutionizing Japan's quality control systems, stressed the importance of front-end market research in his 4-day seminar on quality enhancement.

Redmon (1991) also illustrated the need for market analysis, suggesting that interventions are maintained only to the extent that their maintenance benefits the decision makers in an organization and to the extent that the benefits are apparent to those decision makers. As examples, he cited the failure of management to maintain a refuse packaging program that apparently benefited the garbage pickup crew but not the managers. Similarly, a utility company failed to maintain a pro-

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gram that successfully reduced electricity use, possibly because there were no apparent benefits for the company, even though that program might have benefited society in general.

Bailey (1991) also supported the need for front-end market analysis, suggesting that much consumer resistance to behavior analysis has occurred because "We did not do the front-end analysis with potential consumers to discover exactly what they were looking for, what form it should take, how it should be packaged and delivered, and so forth" (p. 446).

In discussions of social validity, behavior analysts have argued for the importance of doing front-end goal-directed needs analyses. Wolf (1978) stressed the importance of subjective evaluations of the social significance of intervention goals. However, Geller (1991b) implied that the consumer's subjective evaluations of appropriate goals and procedures might not always be our best guide: "In the domain of road safety, for example, most consumers would prefer increased speed limits and no enforcement of safety belt use laws. In the industrial setting, most workers would vote to eliminate requirements to wear uncomfortable and inconvenient personal protective equipment (e.g., safety glasses, hard hats, ear plugs, and face shields)" (p. 182). Geller (1991b) further suggested that we should not rely on "personal (or celebrity) opinion to determine allocation of priorities [in goal selection]. . . . Surely it would be more appropriate to determine a priority ranking of socially significant problems [goals] by systematically applying epidemiological statistics, cost-benefit ratios, and intervention effectiveness data, as well as information about the availability of pertinent resources and socially valid solutions" (pp. 183–184). In other words, Geller recommended a behavioral systems approach to goal selection prior to intervention.

In addition to a goal analysis (market analysis and needs analysis), a front-end analysis can include a task analysis to determine the tasks and supporting skills needed to achieve the goals. Mager (1988) said, "Task analysis is the name given to a collection of techniques used to help make the components of competent performance visible. . . . Every job is made up of a collection of tasks. . . . A *task* is a series of steps leading to a meaningful outcome. . . . A *step* in a task . . . would be something like tighten a nut [or] pick up a scalpel" (pp. 29–30). For each task, the analysis specifies the occasion for the task, the steps in the task, and the criteria for successful completion of the task. In turn, an analysis of the steps and of the student's entering repertoire suggests the skills the training program should establish. Although applied behavior analysts use detailed task analyses in the design of programs to train workers in industry and even programs to train the developmentally disabled, they seem to make little use of such analyses in the design of programs to train other applied behavior analysts.

Finally, the importance of feasibility analyses is just beginning to receive formal recognition by behavior analysts. This is the essence of Geller's (1991b) recommendation that our efforts be guided by "cost-benefit ratios and intervention effectiveness data, as well as information about the availability of pertinent resources" (p. 184). In some senses we might consider such a feasibility analysis to be part of a front-end analysis—something done before the intervention; however, most often we must have some data from an intervention before we can reasonably assess the feasibility of continuing that intervention or implementing similar ones in the future.

Front-End Analysis

Goal Analysis

We can now use these concepts from behavioral systems analysis to consider whether programs to train applied behavior analysts should emphasize the training of research skills.

Market analysis. To get a rough idea of the job market for behavior analysts, I used a printout of the nonstudent membership of the Association for Behavior Analysis. The practitioners constituted 38% of the PhDs, 52% of the EdDs, and 86% of the MAs, although the sample may be biased in favor of university teachers and researchers, who may join and maintain memberships more often

than practitioners. (By practitioner, I mean anyone other than a professor or researcher.)

This preliminary market analysis implies that a large percentage of behavior-analyst alumni of our graduate programs work mainly as practitioners, not as teachers and researchers. So what should we teach the large percentage of our graduate students who will become practitioners so that they can better contribute to the well-being of humanity?

Needs analysis. We already have many effective applied behavior analysis procedures, but few nonbehavior analysts use them. Perhaps our main problem is getting children and parents, students and teachers, employees and employers, clients and therapists, and the governed and the government to use what we already know. As Stoltz (1981) pointed out, "Applied researchers develop useful innovative technologies experimentally, and yet few of these technologies enjoy widespread adoption by our society" (p. 491). Here is an infamous example: The national education establishment failed to adopt the technology of direct instruction, although "the largest experiment in history on instructional methods" had shown it to be dramatically superior to eight other popular methods of instruction in elementary education" (Watkins, 1988, p. 10). As another example, Reid (1991) pointed out,

> Even in the field of developmental disabilities, . . . the actual impact of behavior analysis is well below its potential impact. There is a serious gap in typical service settings between state-of-the-art services, as represented in the professional literature, versus existing services. Indeed, most people who work in developmental disabilities are not very well skilled, or skilled at all, in applied behavior analysis. (p. 438)

So we might spread the use of behavioral technology more reliably by simply increasing the number of practitioners we graduate rather than the number of researchers who generate more technology.

Traditionally, we train even our applied graduate students to be research scientists rather than the staff managers and program administrators that many, if not most, will become. We train them to value research highly and to value those who produce it. Then the new graduates get jobs as practitioners or as managers and administrators and find themselves poorly trained to do the job they were not taught to value. In other words, most of the people paying the pipers are calling for one set of tunes, but the graduate schools are teaching their students to play and value a different set. Furthermore, the graduate schools often fail to teach such an invaluable skill as behavioral systems analysis.

Conclusions of the goal analysis. This analysis suggests we should train fewer scientists and more practitioners. But this does not mean practitioners and managers should not empirically evaluate their work and the systems they manage, nor does it mean they should not make their decisions as data-based as possible. It only means applied settings need a special sort of program evaluation and systems analysis research, and this systems evaluation and research is rarely of the sort that meets the standards of novelty and experimental control properly required for publication in prestigious research journals.

Task Analysis

One useful rule of thumb from behaviorally oriented trainers in industry is to teach only the repertoires essential to the job and the empirically demonstrated prerequisites for acquiring those repertoires. How many nonessential, and thus easily lost, repertoires are we teaching our graduate students in the name of science or in the name of the scientist/practitioner model or in the name of education (as opposed to training)? For instance, experienced task analysts suggest we look skeptically at the history and theory parts of most curricula.

Advocates of training practitioners as scientists argue that the scientist's critical, data-based, empirical analysis skills transfer to decision making in the professional and personal lives of science-trained practitioners. My frequent but informal observations suggest that most scientists show little evidence of their scientific training when making decisions outside their areas of expertise.

Another common argument is that scientific training will allow the practitioner to read professional journals and stay abreast of the latest empirically based behavioral technology. Again, my informal observations suggest otherwise; I think, at most, practitioners usually only skim a few behavior analysis textbooks or handbooks when searching for a new technique—a more efficient technique than scouring and critically evaluating the professional journals. Even if practitioners do read scholarly journals, it may not be cost effective for them to be trained as scientists for the purpose of weeding out poorly conducted and analyzed research; the journal editors have had much more experience doing that.

The sorts of systems analyses and program evaluations appropriate to applied settings often depart greatly from typical research methodology: The scientist carefully manipulates an independent variable to measure its effects on a dependent variable. The practitioner must use intervention or treatment packages to force the dependent variable into an acceptable range as quickly as possible, with little concern for isolating the crucial values of the independent variables.

So before designing our curriculum, we need to analyze what tasks practitioners should do, as well as what they actually do. Those tasks are the essentials. In stressing these essentials, we might reduce the emphasis on history, theory, and methods of science, as well as experimental theses and dissertations for most practitioners. We could then stress areas such as basic quantitative concepts, program evaluation, empirical behavioral systems analysis, social skills, accounting, computer use, project management, management information systems, public speaking, marketing (Bailey, 1991; Lindsley, 1991; Schwartz, 1991) and behavior analysis. Johnston (1991) made a related argument:

> We should make a clear distinction between technological research and technological application. . . . Technological application should not have to focus on asking experimental questions at all, although these will sometimes arise when procedures fail to produce the desired effects. . . . We should represent the different needs of applied research versus practice in how we accept students into graduate programs, how we train them, and how they are employed. . . . It might even be argued that practitioners should receive training that is more service oriented than research oriented. The scientist-practitioner philosophy we seem to have uncritically borrowed from clinical psychology . . . may be counter-productive for this new model. . . . Few careers fit its assumptions very well. Not only are most holders of the doctorate in psychology apparently uninterested in being both researchers and practitioners, it is difficult to do both well. . . . As a general approach to training practitioners the scientist-practitioner model is easy to argue against. . . . The model I have suggested . . . should be seen as enhancing rather than diminishing the role of practitioners. . . . We would no longer need to define their value by such academic credentials as research publications. (pp. 426–427)

Feasibility Analysis

I suggested some issues involved in deciding what we should teach. That was part of an informal front-end analysis. Now we might consider what we can feasibly teach. Even if we should train most practitioners to be scientists, can we do so?

How Feasible Is It to Train Successful Publishers?

How well do we train practitioner/scientists? An applied student of behavior analysis might spend the equivalent of 2 to 4 years learning to be a scientist—a heavy investment for all concerned. What concrete returns does this investment produce? Should such extensive training result in graduates publishing frequently in our most important journal, *Journal of Applied Behavior Analysis* (*JABA*)? It does not. During *JABA*'s second decade, only 26 people published five or more articles there—one article every 2 years.

Of the 784 applied behavior analysts at the doctoral level in the Association for Behavior Anal-

ysis, only 2% are frequent publishers in *JABA*. I took *JABA* to be the journal of first choice for publication of experimental work by applied behavior analysts, although that may not always be the case. However, even if considering frequent publication of empirical research in other prestigious journals tripled this estimate, the percentage of frequent publishers of experimental work would be only 6%. We invest much effort in training applied behavior analysts to be scientists; but applied behavior analysts seem to have a low rate of generating research of a type or quality adequate for publication in *JABA*.

Who Can Train Experimental Scientists?

To acquire reliably the complex and subtle repertoire of a productive experimental scientist, the student may need to apprentice with a teacher who is a productive experimental scientist; book and classroom learning may not be nearly enough. In this regard, who did the frequent publishers of *JABA*'s second decade study with? At least 50% (13 of 26) studied with people who themselves were frequent publishers in either *JABA*'s first or second decade. And, if I may use a double standard for productive research, at least two others studied with a major research publisher, although he was not a frequent publisher in *JABA*. Of course, several confounding factors can contribute to these results; but in any event, the odds are low that someone who is not a productive researcher will train a student who will become a productive researcher. And 22 of the 26 frequent publishers were university professors; so only 22 professors had the skills for productive research in their active repertoire during *JABA*'s second decade. If my criterion is too restrictive, we could triple the number and still there would be only 66 such professors. So what about the great majority of the professors of applied behavior analysis?

If It Is Not Feasible for Most of Us to Train Scientists, Who Can We Train?

Many poor scientists may be excellent practitioners (and of course many excellent scientists may be poor practitioners). We should recognize the value of our practitioner, teacher, and administrator skills and teach those skills, without apologizing and without cloaking them in the guise of scientific research. These are the skills most of our graduates will be paid to use. If we cannot practice what we preach, at least we should preach what we practice.

This is not an antiintellectual, antiscience argument. It is merely an argument that we should leave the training of scientists to those who have science skills in their currently active repertoires; the rest of us should concentrate on training practitioners in whatever areas we effectively practice, whether it be education, industry, the clinic or other areas. (One of the reviewers of this manuscript raised the following point: "Do we need practitioner skills in our repertoires to teach this? Some of my colleagues have ***neither*** practitioner nor research skills at the exemplary levels of excellence advocated here.")

THESES AND DISSERTATIONS

As part of this preliminary front-end analysis, we have glanced at our goals and a few of the relevant tasks needed to achieve those goals. We have also considered the feasibility of teaching the various repertoires. Now we examine the implications of this analysis for theses and dissertations.

Applied students need high-quality training leading to the acquisition and demonstration of professionally relevant repertoires, for example, the skills of doing behavioral systems analysis in applied settings. However, in many programs, when students attempt to do applied theses and dissertations, they must distort their practical intentions to create the illusion of science.

Proponents of the experimental dissertation often argue that the PhD degree is a degree for scholars, not practitioners. Therefore the dissertation must demonstrate scholarship, not practical skills. These proponents of the experimental dissertation seem to imply that if students want to be mere practitioners, then let them get PsyD degrees. But the PhD is no longer just a degree for people who will become professional scholars. I suspect most PhDs in applied behavior analysis do not become pro-

fessional researchers and scholars. And even if the PsyD degree had the status of a PhD, few universities offer PsyD degrees in applied behavior analysis. Perhaps this should change, at least according to this preliminary needs analysis.

In considering the curricula for practitioners, one reviewer referred to Redmon's (1991) suggestion that interventions are maintained only to the extent that their maintenance benefits the decision makers in an organization: "Teachers and researchers only want to train future teachers and researchers because of the benefits to them (e.g., publishing partners)."

CONCLUSION

The present analysis suggests that those few who are successfully training productive scientists should be encouraged to train even more. But the rest of us should take pride in concentrating on teaching whatever useful skills we now possess (e.g., college teaching, one-on-one clinical practice, behavioral systems analysis, or departmental administration). The rest of us should redesign our thesis and dissertation requirements to help our students acquire skills more relevant to practice rather than skills more relevant to publication.

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