Research and Development (and Other Life and Death Matters)

Richard A. Swanson
University of Minnesota

ABSTRACT

Research and development has been a fundamental element of the human performance technology heritage. This treatise is intended to refocus the profession on the importance of research and development (R & D).

Included is the nature of R & D and the R & D cycle. The R & D cycle is particularly important to reflective practitioners who are attempting to advance the knowledge of the profession through creative efforts in the midst of actual field-based performance problems.

A classification scheme for R & D is presented that includes purposes, methods, and categories for embracing multiple views of R & D. Agents of R & D are also discussed with an emphasis on the practitioner's contribution. The manuscript concludes with a R & D agenda for the human performance technology profession and a challenge to the reader.

The research and development (R & D) challenge facing the human performance technology profession has several dimensions. One is to simply hold onto the R & D tradition; a second is to retain and transmit existing R & D expertise; a third is to be open to new research questions and methods of inquiry; and a fourth is to develop more orderly and substantive means of supporting R & D efforts.

This treatise focuses on these four challenges and is divided into sections dealing with the *nature*, *classification*, *agents*, and *agenda* of R & D. Furthermore, this presentation advances the position that research and development are practical means of understanding and advancing the human performance technologies. Ah yes, "There is nothing so practical as good research" (Passmore, 1984, p. 24).

Nature of Research and Development

The purpose of R & D is to expand knowledge and understanding. Like baseball, apple pie, and mom, R & D is easy to cheer for. The process, however, is encumbered with delayed gratification and the need for patience. Researchers believe that at some time in the future, quietly and regularly, the royalties from new knowledge and understanding come rolling in (Swanson, 1984).

The R & D process requires levels of curiosity, discipline, and rigor not required of regular work. For example, have you ever tried to repair a broken machine and got it running without knowing what it is you did that fixed it? And, were you then satisfied enough with your success that you really did not care to learn precisely what had gone wrong and what was the cure? That was not research and development. Research and development requires a rigorous plan and documentation for the purpose of explaining and verifying.

The product of research is *new* knowledge and understandings. Such knowledges and understandings are usually produced in small in-

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development and research, not research and development. This is no small distinction for research elitists. Many would present the three dimensions as levels, not as a cycle. This view places basic research at the top and development at the bottom. To them, development is always the output of research rather than a possible input or important part of the research process.

Practicing human performance technologists spend much of their time engaged in developmental activities. They generally use systematic technologies that have the characteristics of inquiry as part of their developmental activities . This development activity is often a breath away from being research. The logical conclusion from this development perspective is that every practitioner has the potential of being a researcher. Furthermore, it could be argued that practitioners have the responsibility to conduct R & D as they engage in cutting-edge development work.

The development perspective is further analyzed in the current discussion of the crisis of confidence in the professions and the growing scepticism about professional effectiveness (Schon, 1983). According to MIT Professor Schon, the crisis does not depend solely on the question of professional knowledge. But, even within that realm, he contends that "professional knowledge is mismatched to the changing character of the situ-

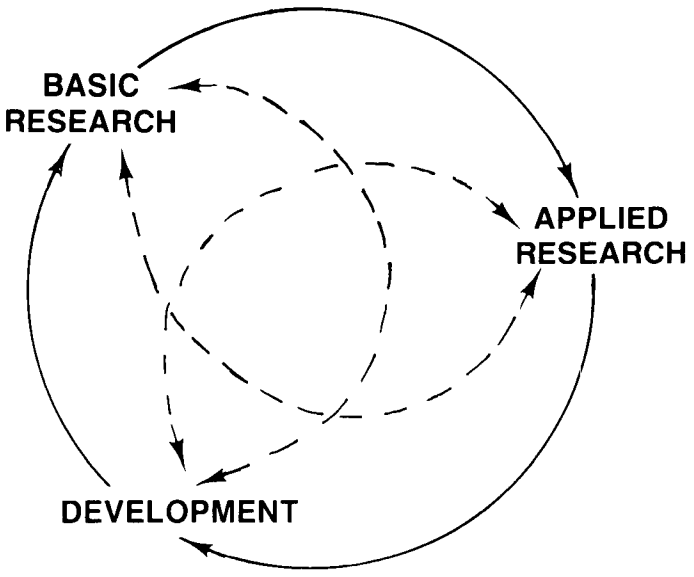

Figure 1: Research and Development Cycle

quantitative and qualitative research. Quantitative research, as the name implies, focuses on converting information into numbers and the analysis of numbers. Quantitative research on instruction, for example, often includes measuring trainee achievement in terms of test scores and a statistical comparison of the average scores from one group of trainees to another. Quantitative research conducted by performance technologists is likely to look at units of work in the form of number of products produced, error rates, or the time taken to perform a task.

Qualitative research focuses on questions of meaning, structure, and relationships and does not rely on information that is converted into numbers. A qualitative researcher looking at instruction might sit through an entire training session observing and recording the actions and reactions of all participants to assess the quality of the training. An example of qualitative research from the performance perspective would have the researcher studying corporate culture through an analysis of the philosophy of its leaders over time, critical events in the history of the organization, and first-hand information about the general behaviors of employees (see Jacobs, 1985).

Classifying research into one of the categories of qualitative or quantitative provides a general clue to the purpose and method of R & D being used. As will be discussed later, it is perfectly reasonable to pursue an R & D activity that has both quantitative and qualitative dimensions. The fact that projects can have both quantitative and qualitative dimensions minimizes many of the intense arguments about the relative worth of these two R & D categories. They both have a place.

R & D Methods. Most discussions about R & D classification have to do with R & D methods. Professionals usually are schooled in one method or another and when they think of or engage in R & D, they focus on their familiar method. A simplified breakdown of R & D methods includes the following:

1. Philosophical
2. Historical
3. Observational
4. Survey
5. Correlational
6. Experimental

The heritage of the human performance and technology profession finds this list reversed in terms of familiarity and perceived importance. Experimental research, the mainstay of instructional technology research, ideally requires random assignment to comparison and control groups, holds all variables constant except the experimental treatment, and carefully measures the results (quantitative). Experimental research provides empirical evidence to support cause and effect statements (see Campbell & Stanley, 1963). A person wanting to know the instructional effectiveness of a new interactive video program would likely use experimental research to determine its instructional effectiveness in comparison to a traditional or existing instructional program.

Correlational research methods typically rely on numbers and statistical methods to search out relationships between variables. Relationships between variables are demonstrated through correlation coefficients that can range from positive +1.00 to negative -1.00. A perfect +1.00 relationship between two variables tells the researcher that with

mance technology. R & D into the needs assessment (Kaufman & Stone, 1983) and work behavior analysis (Swanson & Gradous, 1986) activities of the profession rely heavily on qualitative observations and are grounded in the profession's general perspective "that all we really ultimately have in psychology is observable behavior (i.e., performance). As a result, it is held, any serious focus on competence (i.e., an abstraction) diverts us from our primary goal of what the learner does in performing various tasks and how this behavior is determined by cultural and stimulus effects" (Overton, 1985). While the human performance technology profession is comfortable with qualitative research and with observational methods, it is inclined to do so from a perspective that is fundamentally quantitative (Fetterman, 1982).

As Filstead (1971) has pointed out, "those research strategies, such as participant observation, in-depth interviewing, total participation in the activity being investigated, field work, etc., allow the research to obtain first-hand knowledge about the empirical social world in question. Qualitative methodology allows the researcher to 'get close to the data' thereby developing the analytical, conceptual, and categorical components of explanation from the data itself" (p. 6). The anthropological approach of taking on the role of the other to grasp at understanding is new to the human performance technology profession and will require an expansion of the profession's methodological base (see Agar, 1980; Patton, 1978, 1980; & Pelto & Pelto, 1978).

Historical research, which is usually qualitative, is the integrated presentation and description of the relationships between persons, events, times, and places that have existed in the past. It includes trends and their interpretation. While it is common belief that every area of human endeavor can benefit from the study of its own history, there has been little evidence of this truism in action within the human performance technology profession. This may be explained because of the short history of the field and because of the focus and priorities of the profession on current critical issues. Historical research, though, is beginning to be done as some companies look to their own history to understand their culture. Also, as the substance of the profession matures and shifts from instruction to performance, there is a demand for perspective over time. Historical research, in a changing society, has as its minimum purpose keeping us from recycling through old theories and practices that have new labels.

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Historical R & D requires the investigator to limit the scope of the inquiry, to search for and authenticate sources of information, to evaluate the relevance, meaning, and dependability of information, and to logically organize the information so

odology, the notion that the most serious difficulties which confront behavior science are 'methodological', and that if we hit upon the right methodology, progress will be rapid and sure" (Kaplan, 1964, p. 24).

> In this vein, researchers of problem solving behavior talk about the problem definition and method interaction. If a person has a strong method of solving a problem, they will tend to use it. Furthermore, reliance on method will likely bias the definition of the problem to accommodate the researchers strong method.

In research, the various R & D methods and R & D categories each carry a set of strengths and weaknesses. Many have already been discussed. Researchers need to stand back when defining research problems to make sure that the *purpose* of the research endeavor is made clear. Once the purpose is clear, appropriate methods can be selected. The classification of purposes encompasses four realms. They include:

1. Ends (to critique and identify potential)
2. Meanings (to understand and interpret)
3. Status (to describe)
4. Means (to explain, predict, and control)

The vertical dotted lines in Figure 2 are a crude effort at aligning *purposes*, *methods*, and *categories* of R & D. Not all studies are isolated to a single purpose, method, and category. Any one project can have more than one purpose or method, and be of both types. Complex studies of this nature, however, are not recommended for inexperienced or beginning researchers. Even for the serious scholar, a program of research is best viewed as a purposeful series of small related studies designed to answer an important question.

Agents of Research and Development

Just who cares about supporting and/or conducting R & D? There are several such agents of R & D and they do not always have a common agenda. Therefore, it is important to identify the various perspectives that these agents —universities, governments, companies, and practitioners—bring to R & D.

Major universities see research as primary to their purpose and, yet, they almost totally rely on the motivation and entrepreneurial spirit of individuals to carry it out. Beyond a philosophical commitment, university programs of R & D are notoriously underfunded (if funded at all by the university), revolve around the publish or perish motivation system, and rely on the ability of individuals to attract external funds.

Governments allocate R & D resources largely based upon a political process which emphasizes contemporary issues. As a result, only a few areas, like defense and cancer research, have enjoyed significant long-term funding. Learning psychology and instructional technology R & D have been the benefactors of the continuing military training commitment.

Industry and business also fund R & D. Their research is most likely to be directly linked to the goods and services they produce. Firms have been hesitant to fund R & D beyond their primary business arena. When they do fund human performance technology R & D, they almost always do it on a project-by-project basis, utilizing an ad hoc criteria. Furthermore, given the competitive nature of the private sector, firms often do not

some of the contemporary issues. As thoughtful practitioners, we need to act in these areas. We also need to act with discretion. Some of that discretion should come in the form of solid R & D.

Passmore may have overstated the case when he called researchers the "creme de la creme of skeptics" (1984, p. 25). But, the fact remains that our profession has a record of swallowing and preaching the most current fads. We are part of "an industry of instant managerial gurus, new idea-consultants. . . . promising the latest quick fix" (Byrne, 1986, p. 54). Even if we are not guilty through action, we become guilty through our inaction. As a vivid example, how many of us got caught up in perpetuating Naisbett's *Megatrends* (1982)? Many of us did. How many of us stopped to ask if Naisbett's method of crystal-balling the future through selected newspaper headlines was reliable and valid? It did not make complete sense then and has not yet proven itself (Cheney, 1985). Our silence condoned his method and conclusions. As human performance technologists, we should have been on the forefront of criticizing Naisbett *and* simultaneously experimenting with his form of content anlysis. We did neither.

The human performance technology profession should not be satisfied with unsubstantiated simple solutions to complex problems. Furthermore, we should be an important source of the research that undergirds our professional practices. R & D efforts, no matter how small, should be encouraged and nurtured.

New methods of inquiry. Our R & D methodology perspective needs to be expanded. The experimental-empirical research perspective of human performance technology has served the profession well. The case for this perspective was forcefully made by Wydra (1983) in his address titled "One, Maybe Two Critical Truths." And while we should continue in this view, we must also learn about the inherent biases in any methodology. Critics tell us that "there is something desparately wrong and conceptually confused in the relentless attempt to force the description and explanation of human action into the grid of empirical natural science" (Berstein, 1978). They go on to tell us that "the sciences and scientific method will probably always leave unanswered the most interesting questions about man and his place in the world. However, we should be very foolish if we do not take into account what science can tell us" (Smart, 1974). We also need to ask the larger R & D purpose questions that are usually qualitative. This shift will allow us to entertain alternate methodologies and the most appropriate methodologies for the purposes of our research. At this point in time the human performance technology profession is a pauper in

The motivation to conduct R & D is a desire for progress by challenging the fads, myths, and assumptions that surround the complex issues of human learning and productivity.

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