DIVERSITY IN MATURE READING: THEORY AND RESEARCH

TWENTY-SECOND YEARBOOK OF THE
NATIONAL READING CONFERENCE
VOLUME 1

Edited by
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Published by
The National Reading Conference, Inc.
Boone, North Carolina 28608

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PRESIDENTIAL ADDRESS
A SIMPLE MODEL FOR THE IMPROVEMENT OF COLLEGE-TRAINING PROGRAMS FOR READING DEVELOPMENT

The term "model" is much in vogue these days in the field of reading. One of our former Presidents, Albert J. Kingston, was one of the first to call for the construction of more sophisticated models of the reading process. There are, of course, many different kinds of models related to various domains such as perception, learning, retention, language development, reading, curriculum. There is also, unfortunately, a plethora of conceptualizations of the term "model" itself which serves to befuddle even the most determined reader of the literature on this important topic. However, without going into the complexities of this problem, I shall use a very general definition of this term as, "a method of specifying the components of a complex process." A good model will serve a number of useful purposes such as increasing our understanding of a process by demonstrating relationships among components, calling attention to elements which one might overlook, suggesting hypothesis and applications.

The purpose of this address is to demonstrate some important implications of a simple "behavior modification" model for improving college training programs for reading personnel. Although this model could apply to training programs for various types of reading personnel, the reference group used in my address, will be graduate students in a training program designed to produce instructors in college reading improvement centers. This is done for purposes of clarifying major concepts

within reasonable time limits during my presentation.

A basic assumption underlying this address is that a training program is not effective unless it induces changes in the behavior of students in the program. These changes must, of course, be related to the objectives of the program. Now this assumption must sound so obvious that one might ask why it is even mentioned. Strangely, however, this common sense assumption has been ignored, in the main, throughout the history of education until recent years. In my judgment, the proper use of a "behavior modification" model in curriculum construction will enhance the effectiveness of any training program, because it offers a direct and efficient means of changing specified student behaviors and measuring these changes.

My general procedure for developing this thesis is first, to show how the model can be applied in teaching a simple response to an animal. Second, I shall give a brief example of the use of this model in teaching a type of reading behavior to a college student. Third, I will suggest uses of the model for the improvement of the college training program. (Theoretical purists should be warned of some distortions of the original model, as it applies in the experimental laboratory, in comparison with its application to teaching reading and in the example of its use in curriculum organization.) Fourth, following these three examples of model utilization, I will discuss briefly some problems which will be encountered in deriving applications from the model together with some suggestions for effective implementation.

After this prolonged introduction, it is time that we get to the central topic of this presentation, namely the model itself. To facilitate your understanding of the relationships among the the main concepts in the model as they apply to my examples, I would suggest that you refer to Figure 1, Applications of a Behavior Modification Model.

The first column in Figure 1 presents the basic components of a Skinnerian behavior modification model. These components are as follows: define behavioral objective, determine operant level, select reinforcement, provide for adaptation, shape behavior, and determine operant level.

Teaching a Pigeon to Emit a Response Under Experimental Conditions

Let me give a brief description of the application of this model to the task of teaching a pigeon enclosed in an experimental apparatus to peck a spot on the wall of this device. Everything in the training sequence should follow a precise description of this behavioral objective. Since learning can only be measured in terms of the difference in behavior which occurs between two points in time, it is necessary to measure the ability of the pigeon to perform this act both before and after training.

Figure 1

Applications of a Behavior Modification Model

Skinnerian Behavior Modification Model	*Teaching a Reading Skill*	*Improving a Training Program*
(Pigeon as subject)	(Reader as subject)	(Graduate students as subjects)
A. Define behavioral objective	A. Define purpose of lesson	A. Define program objectives
B. Determine operant level	B. Carry out diagnosis at appropriate level	B. Assess student behaviors relative to program objectives
C. Select reinforcement	C. Devise suitable reward system for reader	C. Determine reinforcement strategy to facilitate behavior change
D. Provide for adaptation	D. Establish readiness for task	D. Make provisions to gain gradual acceptance of proposed modifications
E. Shape behavior	E. Teach reader to attain purpose	E. Modify program by gradually shaping student behaviors
F. Determine operant level	F. Administer test of purpose achievement	F. Assess student behavior after training

As a measure of the strength of this learned behavior, the experimenter should keep a record of the number of times the pigeon pecked the spot on the wall during a specified period of time. This measurement is known as the "operant level." The third step should be to select an appropriate reinfrocement for the pigeon under these particular training conditions. Reinforcement is defined operationally as any stimulus following a response (or behavior) which increases the rate of the response in the future under the same circumstances. Thus, reinforcements must be pre-selected based upon empirical observations. In this case, kernels of corn might be found to be effective as reinforcers. Fourth, to maximize learning, provisions must be made to help the pigeon adapt to a novel and, hence, potentially threatening situation. This could be accomplished by delaying the training procedure for a short time after the pigeon is placed in the experimental device and giving him kernels of corn not contigent upon any type of behavior. Thus, emotionalism which might interfere with learning could be reduced, and the training situation itself might become a reinforcing environment rather than an aversive situation. Now we are ready to begin the teaching (i.e., shaping) process. Shaping behavior should be accomplished through a process of reinforcing successive approximations to the behavioral objective of pecking the spot on the wall. If we should wait for this behavior to be emitted before we reinforce it, it might never occur. Therefore, as the pigeon makes even the slightest

progress toward the objective (e.g., looking toward the wall, moving toward the wall, touching the wall, pecking closer to the spot, etc.), he should be reinforced immediately. As the behavior is shaped to more closely approach the desired objective, behaviors which were formally reinforced would be put on extinction and only closer approximations to the objective would be reinforced. Once the spot pecking behavior is shaped, then this behavior must be strengthened through appropriate use of some type of reinforcement schedule. Time does not permit a discussion of this complex problem. Finally, the strength of the learned behavior should again be measured in terms of its operant level at the termination of the training sequence.

Teaching a College Student to Read Main Ideas in Paragraphs

Now, let us see how the "behavior modification" model might help us in teaching a particular reading behavior to a college student. At first thought, this might seem like a far-fetched analogy. In my view, the model is altogether appropriate in both situations. In the present case, the behavioral objective for the student is the ability to read the main idea in paragraphs written at a college textbook level of difficulty. The student must express the main idea in his own words, either orally or in writing after reading the paragraph and without reference to the material.

The second step suggested by the model should be to determine the student's present "competency" to perform this behavior under prescribed conditions by administering a valid test of ability to identify main ideas found in college textbooks. At this point, it is apparent that the measurement of behavior as an indication of learning is different in the case of the pigeon's "operant level" and the reader's "reading competency" as measured by conventional tests. These reading tests use some standard of "response correctness" rather than "rate of response" as a measure of strength of learning. Although "rate" is usually a component of most testing procedures, it is usually included indirectly in the form of some time limit for most reading skills other than "reading speed," as such. In fact, most "behavioral modification" applications to human behavior do not include a true measure of "operant level" as a means of measuring learning strength. Despite this fact, many "behavior modification" experiments and clinical applications are reported using other measures of behavior and learning. However, in my opinion, there is a great need for developing valid procedures for measuring true "operant levels" in reading and, indeed, other educational areas. This type of measurement would provide a degree of precision in testing and research which is badly needed in both the diagnosis of reading difficulties and the assessment of treatment effects.

The next step in our model involves the selection of reinforcements. This is a concept which is widely misunderstood in educational circles. Many reading teachers identify "reinforcements" with merely giving material rewards to students as "bribes" for appropriate behavior. In fact, the ultimate objective of the "behavior modification" approach to teaching reading is to produce readers who find the reading act *self-reinforcing*. Many students attain this objective early in school, but others need to learn that reading can be rewarding as well as a means to some other type of rewards. Perhaps the concept of "levels of reinforcement" as used in the excellent book *Systematic Reading Instruction* by Duffy and Sherman (Harper and Row, 1972) will be helpful in understanding this problem. Keeping in mind that reinforcement is the stimulus that "pays-off" for a particular reader, in teaching this individual we should start out at an appropriate "level of reinforcement" for that student and gradually move to progressively higher levels in the light of observed results. These levels of reinforcement are (a) physical rewards such as trading stamps, tokens, or points which can be exchanged for desired objects or activities, etc., (b) touch or movement such as approach, pat on shoulder, handshake, etc., (c) verbal praise, a smile, or approval of response, etc., (d) self-rewarding behavior. Techniques for making creative use of these levels of reinforcement without becoming fixated at one level or resorting to an overly simplified mechanical system are to be found in the literature on "behavioral modification." An important principle to be remembered is that the degree and amount of reinforcement must be appropriate to the aversiveness of the task for an individual reader. Improper use of reinforcement procedures will yield negative results and cause many teachers to reject this entire approach without giving it a fair chance.

Providing for adaptation for a college student is a type of "readiness" for the task which is easy to overlook. This procedure could take various forms such as establishing a friendly relationship with a student *before* the training commences, introducing the student to the materials, equipment, and general organization of the classroom or reading laboratory, explaining fully the purpose of the lesson and its relationship to the total program, providing him with easy, yet interesting, main idea problems which allow him to succeed at the beginning of training, etc.

At this point, it should be clear that effective use of "behavior modification" principles involve considerable planning before teaching begins. Without going into the details of the "shaping" procedure, it should be stressed that this teaching approach should involve breaking down the "reading for main ideas" behavioral repertoire into its simplest component responses, determining the pre-requisite repertoire of behavior necessary for emitting each of these responses which make

up the total behavior, and determining the most effective sequence for teaching these response components. This can be done most effectively by proceeding in a hierarchial sequence from the easiest to the most difficult components of the total behavior. Based upon such an analysis, the "shaping" procedure should entail starting at an appropriate level in the response hierarchy for an individual reader and setting up conditions so that the individual will learn to emit the correct behavior for reading the main idea through the reinforcement of successive approximations to this goal. Let us assume in a hypothetical case that a reader possessed the behavioral repertoire for reading main ideas through some easy approach. We could then proceed by having the student recognize the correct response from two or more alternatives while looking at the printed material. Then the student could choose the main idea from several alternatives without reference to the passage. Finally, he could express the main idea in his own words. Other shaping practices might include starting with materials written at easier levels of readability and/or written about subjects of familiarity or particular interest to an individual reader and proceeding to more difficult and less familiar materials. It is also important to provide practice in maintaining the strength of learning once the criterion has been obtained and organizing appropriate practice conditions to facilitate generalization of responses across various content areas.

The final step in this sequence should be to determine the strength of the learned response sequence without external reinforcement over a specified period of time following termination of training. Planned reviews of this reading behavior after training should help to maintain appropriate strength of learning for this important reading behavior.

Improving A College Training Program

By this time, the application of these basic sequential components in the "behavior modification" model should be clear. Therefore, the application of each component of the model to improving a training program for instructors in a college reading improvement program will be presented in less detail than in the preceding examples. Also, the treatment of this topic will be more general due to the hypothetical and complex nature of the task. First, the objectives (i.e., competencies, values, appreciations, etc.) of the program as a whole should be specified in considerable detail. It is probably best to begin this task by using familiar cognitive terminology and then to translate this terminology into behavioral terms. Sources of information which might prove useful in formulating such a list would include descriptions of the objectives of other training programs, interviews with directors and

staff members of other programs, tests of knowledge and skill in teaching reading, psychological and linguistic analysis of reading processes, flow charts describing scope and sequence objectives in published materials, and some scant information from the research literature. In translating the initial description of program objectives into behavioral terms, a careful study should be made of literature on techniques for writing behavioral objectives.

At the college level, the selection of reinforcements for individual students is perhaps, the most easily overlooked step in the model sequence. Here, we are not talking about the use of "M & M's". We are concerned with making provisions for effective levels of reinforcement which will help pre-service and/or in-service reading teachers to learn more efficiently. It is, indeed, naive to assume that all or even most college students even at the graduate level find learning self-reinforcing. It is equally naive to place almost exclusive reliance upon test results or course grades as reinforcers. Proper attention to this problem is the most important aspect of bringing about curriculum change at any educational level. The basic principle of "reinforcement" operates at all levels of maturity.

Provisions for adaptation to changes in the training program are just as important for college students and/or staff members as they are for pigeons. People and programs cannot be changed overnight. Significant change entails unpredictable consequences which will threaten many people. Adaptation can be facilitated by involving participants in the decision making process, anticipating difficulties and their solution, giving encouragement and support to everyone concerned, and preparing the way for progressive modifications by moving slowly at the beginning and building a non-threatening psychological environment where freedom to try novel approaches is not suppressed by unnecessary criticism and pressure to produce immediate results. Pre-training assessment of student behaviors in the program should follow directly from the previously formulated program objectives. There are various ways of doing this. An efficient procedure is to use a screening test to get a tentative idea of the general competency problem of each student in various "categories" of objectives" such as knowledge and use of materials, teaching strategies for various reading problems, diagnostic procedures, classroom management techniques, etc. After this preliminary screening procedure, individuals can be given specific pre and post-training criterion referenced tests of mastery in those categories where they show the need for more knowledge and skill.

Of course, each student must be reinforced for gradual improvement toward behavioral objectives appropriate for him to master. Time should not be wasted in teaching students things that they already know. For

many students, reinforcement should not be limited to test results alone. Immediate feedback of results supplemented by other types of reinforcement will produce the best results for many individuals. The program as a whole, and each course in the program, should be organized around the mastery of specific competencies rather than "course titles" and "catalog descriptions."

Student competencies should be measured before and after the teaching of specific behavioral objectives, before and after each course, and before and after completion of the program as a whole. All too often, there is a large gap between the professor's verbal statements of program objectives and the skills and knowledge measured by examinations. For the student, the tests constitute the real objectives of the course or program of instruction. Continuous mastery tests with emphasis upon their functions as learning aids rather than grading devices will provide both definite goals for the student to work toward, and also will reduce the anxiety induced by vague expectations of professors.

In my judgment, the creative integration of the components of this "behavioral modification" model for improving a college training program for reading personnel offers great promise for efficient and effective curriculum change. However, this is no magic formula which can be followed mechanically as an easy solution to a complex problem. Let me make some comments about several problems of implementation and some suggestions for increasing the likelihood of success in this enterprise.

Concluding Comments and Suggestions

Improving your training program even with the use of an efficient model is a difficult and time-consuming process. It will be tempting to skip or de-emphasize one or more steps in the model in an effort to achieve more rapid change. It is most important to resist this temptation. Many education programs fail because naive administrators think that fundamental program modifications can be brought about through administrative *fiat.*

It will take considerable planning to define the various objectives of any course or program. A realistic and flexible time schedule should be used with the explicit understanding that objectives can only be constructed through much time and effort on the part of the staff. Remember that the behavioral objectives of *your* program should not only be in conformity with generally accepted competencies for teachers of reading to college students, but they should also reflect the unique characteristics of your particular approach to teaching and the philosophy of reading appropriate to your institution. The objectives should include

not only the skill aspects of teaching reading but also the teaching of higher level cognitive processes including both convergent and divergent thinking and critical evaluation. The objectives need not be limited to those behaviors which can be definitely labeled "right" or "wrong." Certainly the recreational aspects of reading should be a vital part on your list of objectives. The objectives might not only be derived from critical observations and personal experience, but might well reflect a particular theory or model which serves as a central focus in your training program. Certainly, selecting and defining behavioral objectives should reflect an understanding of the psychological and linguistic sciences which form the foundation for any sound training program in reading.

The assessment of competencies in teaching reading should include not only tests of knowledge but observation of teaching behaviors such as diagnosing reading problems, using specific diagnostic and teaching techniques, proper classroom management, etc. All the previous comments suggest the desirability of "criterion-referenced" tests to measure mastery of the specific objectives in your program. However, there are some false and over-simplified notions about these kinds of tests you should be aware of. One multiple-choice item does not measure mastery of an objective. The problems of reliability, validity, errors of measurement, etc. remain to be solved in these kinds of tests. If you use norm-referenced tests, you should be aware of their limitations, particularly for slower learners and more advanced students. In particular, in evaluating the effectiveness of your program with standardized tests, you should know the difficulties of obtaining significant pre-post mean differences based upon tests which have been devised to produce maximum variance in the distribution. This fact is not generally understood by many educators. An important paper by Robert Glazer entitled *Instructional Technology in the Measurement of Learning Outcomes: Some Questions* delivered at a symposium of the American Educational Research Association in 1963 suggests radically different procedures for item construction and analysis for criterion-referenced measures as contrasted with conventional procedures. Another particularly important paper on criterion-referenced tests is *Testing for Accountability* by Ralph W. Tyler (*Nation's Schools,* Vol. 86, No. 6, Dec. 1970). This paper is an excellent source of information about these kinds of tests as compared with norm-referenced tests.

Regarding the problem of "reinforcements," do not be deluded by the belief that the student's intrinsic motivation for learning plus the teacher's use of conventional grading procedures will produce optimum learning. Even in the graduate programs of today, we are no longer dealing with an educational elite. Therefore, extrinsic forms of reinforcement become more important to the professor and student. Remember

also, that reinforcement is highly individualistic. What will "turn on" one student will "turn off" another student. Proper use of reinforcement procedures is particularly important for culturally deprived students.

In providing for adaptation, it is vitally important that revisions in your program should proceed with great caution and careful planning. Change tends to be threatening. If you move too rapidly and without careful preparation, students are apt to resist these changes and be uncooperative in their attitudes.

All good teaching is based upon the basic principles involved in "shaping." Be careful about holding such high standards that your students give up any hope of attaining them. It is the professor's responsibility as a teacher to make the gradual transition from the students' initial level of competency to their mastery of the program objectives. A basic and controversial assumption of this model is that (with some few exceptions) "student failure" is basically an indication of "teacher failure." It is important to keep in mind that the behaviors to be shaped in a good training program include actual teaching behaviors and not merely verbal behaviors based upon assigned papers, readings, tests, etc. These behaviors constitute the final proof of the success or failure of your curriculum.

Finally, in assessing the outcomes of your program, you will probably be interested both in post tests of achievement and comparison of pre- and post-training tests as indications of learning. Unfortunately, achievement is much easier to measure than is learning, due to inherent difficulties involved in measuring gains for individuals or non-representative groups of students. For information on this important point, see articles by Dr. Frederick Davis and others in previous *National Reading Conference Yearbooks.*

In the last analysis, the success of your revised program of training must be reflected not only in changes in the behavior of students who are being trained in your program, but also the reading behaviors of students being taught by these graduate students in the college reading center. Only if careful research demonstrates such things as better reading, better academic work, more interest in reading for recreation, etc. as a result of the changed program, can you be confident that your new program is a success. This suggests that solid grounding in statistics, measurement, and research design be included among the objectives of your training program. But that is a topic for another speech!

In conclusion, you may have noted that nothing has been said about modifying the behavior of professors in the program so that they will not simply continue to teach in their accustomed manner. But this is dangerous territory. As the courtroom lawyers so conveniently say, "Strike that off the record!"