Chapter 3

Precision Teaching: A Useful Technology for Special Education Teachers

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FOR QUITE SOME TIME we have seen an ever increasing array of technological devices designed to enhance the teaching process in both special and "normal" classrooms.

We have seen variation upon variation of audio-visual aids, teaching machines and computerized systems designed to expedite the transmission of knowledge from the educational system to the child. Though there is probably no question that the classroom of the future will be a computerized one in which the child's educational development will be mediated through carefully planned and constructed programed materials, at the present time there would appear to be several problems connected with such programing.

First, and possibly foremost in the minds of some, though a fiction if one thinks about it carefully, is *cost*. Our educational system is, as yet, unwilling to move to costly retooling until such time as the effectiveness of computerized programs has been proven more clearly, even though the cost over time may eventually prove to be far less if one bases the return on the amount of knowledge gained.

Second, we are still in the stage of simply storing information, at least in education. We do not have readily available computers which can make educational decisions based on the individual progress or functioning of a child. Educational programing is still in its infancy, and it must progress far beyond current levels before it can begin to approach its ultimate potential.

Finally, the range of programs which must be devised if we are to adhere to the concept of individualized instruction is so great that the problems of computerization are unquestionably multiplied. It becomes apparent that we not only have to teach children reading, writing and arithmetic, but that we are daily faced with a multitude of social behavior difficulties and needs as well. Special education provides an excellent example of such difficulties. In special programs, we face not only unique academic learning difficulties but frequently a wide range of social behavior learning requirements. We must teach Johnny to button his coat, and Mary to wash her hands. We must teach Billy to stop hitting and Kathy to stay in her seat so that learning may take place. We must teach Greg to respond differentially to sound and lip movement, and Jill to develop small-muscle skills. These and many more constitute the myriad of problems with which an advanced educational technology must cope. We now have the potential for just that kind of technology as a result of the development of the Precision Teaching method by Dr. Ogden Lindsley and others.

An adequately functioning and effective computer system requires at least two components: A language system which is consistent and which can be used and understood by all who work within the system (and hopefully by those who are outside the system) and a means of adding new information or feedback to its computation. Precision Teaching does this and much more:

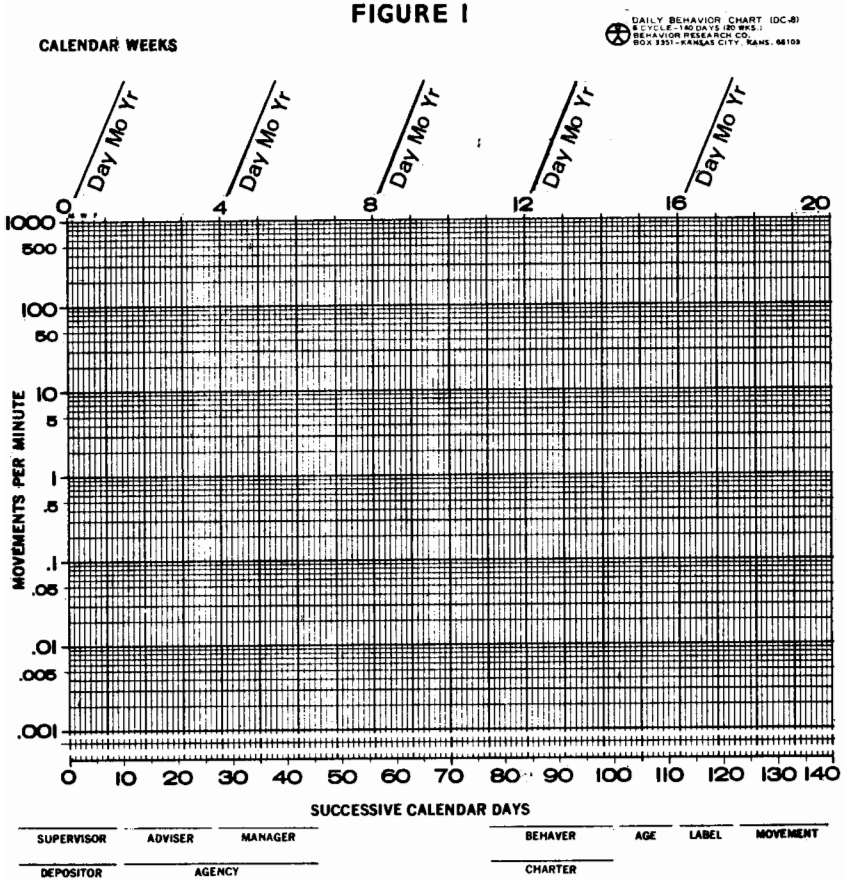
- It provides a common language, a means of communication through which *all* those involved with the education of a given child may begin to communicate in precise and understandable terms.
- It requires that we become definitively precise in our description of behaviors of concern, whether they be academic, social or physical.
- It involves all aspects of the learning situation, including environmental conditions and other stimulus variables, whether these stimuli be curricular materials or social conditions, as well as the consequences which may result from behavior.
- It provides an ongoing, immediately available effect of any changes which may be attempted in order to modify the behaviors in question.
- It allows us to make precise changes in specific parts of the learning environment, either antecedent or subsequent to the behavior of concern.
- It allows us, in a very precise way, to do that which we have given lip service to for so long, to begin to "understand" the child and to let his *behavior* guide us in terms of our educational decisions.
- It provides us with a system which is not simply imposed on a child and maintained by a teacher, but a system wherein the child can very quickly take over the responsibility for his own behavior management and learning and the maintenance of all records, thereby tremendously increasing the potential applicability of such a system.

Basically, there are four components to the Precision Teaching program. The first is a system of recording and charting data in such a way that one has a continuing, readily available record of behavioral changes which may be occurring. Specific behaviors may be either accelerated or decelerated. Lindsley has developed a six-cycle logarithmic chart which, in the opinion of this writer, has a potential never before available to educators. It combines the unique qualities of precise data recording of the widest possible frequency range (frequencies ranging from one behavior every thousand minutes to one thousand behaviors every minute may be recorded on the same chart) and simplicity (though initially formidable looking, it has been dramatically shown that third graders can readily learn and chart their own behavior rates without any difficulty whatsoever).

Not only does the chart allow one to record any behavior which is definable in terms of rate of occurrence, but it has also been "calendar synchronized" in order that, whether one is carrying on one project or a thousand, a visible time representation is provided, not only from the standpoint of the daily, weekly or monthly progression of individual behaviors, but also as a comparison of beginning and ending dates of different projects.

An example of this chart is shown in *Figure 1.* Just below the abscissa, or base of the chart, the caption "Successive Calendar Days" will be noted. Just above that it will be noted that vertical lines on the chart are numbered from zero to 140. Each of these 140 lines represents one calendar day, with every seventh line (darker lines) representing a Sunday. Along the top of the chart, running horizontally, it will be noted that every fourth Sunday is marked with the numerals 4, 8, 12, 16 and 20, and above each of these numerals is a place for the day of the month and year. It can readily be seen, then, that the chart can be marked not only in terms of days of the week but in terms of weeks and months of the year in order that consistency of the time factor can be obtained in all projects in which Precision Teaching is attempted. Along the left ordinate or vertical axis of the chart, the caption "Movements per Minute" can be seen; and, just to the right of the caption, are numbers ranging from .001 to 1000. This numerical order allows one to represent visually the rate at which the specific behavior of concern is occurring. This rate is obtained by counting the frequency of occurrence of a specific behavior and dividing that frequency by the number of minutes during which counting was undertaken, hence "Movements per Minute." All data in Precision Teaching projects is graphed on a "Movements per Minute" basis. It will further be noted that from bottom to top there are six cycles on the chart, each a multiple of ten of the previous cycle. For example, .001 proceeding to .002 and so forth up to .01, at which time the count changes to .02, .03, etc. The use

FIGURE I



of the logarithmic chart system allows a proportional representation of data, and eliminates the distortion normally obtained from "ruler" type charts.

The second component of the Precision Teaching method is the requirement of precise "pinpointing" or defining of those behaviors which one may wish to alter. It must be remembered that all data within the precision management program are based on *rate*. Lindsley has defined "pinpointing behaviors" as "movements," and he feels that an adequate pinpoint must have two basic characteristics: 1) It must have a definable beginning and end, in other words, be a complete movement cycle. For example, a "thumb sucking" movement would require that the thumb first be out of the mouth, then in the mouth, then out of the mouth in order to be a complete movement. 2) The pinpoint must pass the "dead man's test." If a dead man can do it, it can't be counted. Once behaviors of concern have been charted in this way it is possible to begin recording data in a precise and objective manner in order that we may obtain continued feedback with regard to the effect of any attempts which we might wish to make to alter that behavior.

It can therefore be seen that the two initial components of Precision Teaching involve the use of an extremely practical recording and common language system which allows both those directly involved in the project, and others as well, to quickly understand and recognize not only the purpose of the project but the progress of the individual. It brings into immediate focus both our successes and failures as teachers, and it requires that we begin to do something besides give lip service to the concept of individualized instruction. Examples of Precision Teaching projects follow.

Project Examples

One Precision Teaching project was initiated by a teacher in an attempt to decelerate the rate at which a thirteen-year-old boy tugged and pulled at her during the school day. During the week beginning Monday, October 28, 1969, this child, according to the chart kept by the teacher, was pulling and tugging at the teacher at a middle rate of four times every hundred minutes, with the rate accelerating during the week. On Monday, November 3, 1969, the teacher initiated a change in the project. She simply began turning her back on the child each time the behavior occurred. An immediate deceleration in the behavior rate began to occur. At the end of a five-week period she had successfully decelerated this behavior rate from a middle rate of four times every hundred minutes to a middle of once every hundred minutes. In other words, she decreased the behavior by a divisor of four during this five-week period.

In another project, the teacher attempted to decelerate the rate at which a boy in her program was talking out during a specific twenty minutes of the school day. Initially this talk-out rate showed approximately one talk-out per minute. In this instance, again the teacher made one simple change at the beginning of the second week, keeping all other factors constant. Each time this child talked out, she called on *another* child with his hand raised. In a six-week period, this child's talk-out rate had decreased to zero. In this case, as in all projects, there was daily, visible feedback from the chart with regard to the effect of this change on the child's behavior.

A third example is a project in which the teacher wished to decelerate the inappropriate use of the pronouns *me* and *my* and increase the use of the pronoun *I*. During the first week, or reference period, it was noted that the child inappropriately used these pronouns at a middle rate of two per minute, according to the teacher's chart. At the beginning of the second week, keeping all other variables constant, the teacher asked the child to count his own errors – and they kept a daily chart together. During the next five weeks, the child's error rate dropped from two per minute to one every two minutes. In other words, behavior frequency was divided by four. Un-

fortunately, this project had to be terminated at this time due to circumstances beyond the teacher's control.

Another example is that of an academic skills project designed to measure the effectiveness of a reading vocabulary building program with a young boy with a severe learning disability. In this case, the teacher felt that the child should attain a reading rate of approximately thirty words per minute on words which he had already been given before any new words were added. At the end of a three-week period, the child had attained this rate fairly consistently, and a change was initiated in which ten new words were added to his list. As expected, his rate immediately dropped to approximately ten words per minute with the addition of the new words and then gradually began to accelerate to the desired level. This is an excellent example of a curriculum project in which the teacher has allowed the *child's* behavior to determine when changes should be made in curriculum.

A final example is that of a project in which the precision charting procedure continually pointed to the *inadequacy* of the educational program, but was continually ignored. In this instance, a proficiency level of nine to ten problems per minute was indicative of readiness to proceed to a more difficult level of mathematics facts. Although there was some variation, this child, from the beginning of the project, was capable of attaining the required rate on single-digit addition facts. However, despite the evidence, the teacher continued for *six* weeks before making a change to a more difficult level. When this change was finally made (from one-digit to two-digit addition) there was *no* rate change, indicating that the child had already attained proficiency at this level. A careful examination of the child indicated that not only was he able to do addition facts at this level and much higher – he was also able to do subtraction, simple multiplication and simple division. This teacher had literally wasted everybody's time, and the child had simply learned *not* to learn for a period of almost two months. Had this teacher paid attention to her chart, this situation might have been remedied in a few days instead of months!

The IS-DOES Formula

An important component of the Precision Teaching method is the IS-DOES formula, in which Lindsley has attempted to include all of those environmental variables which might have an effect on the performance of an individual.

Not only are we far too imprecise in our designation of those variables which may affect the learning process, but even when we do attempt to become specific we too frequently mislabel these variables. Over and over again we refer to "stimuli" which do not stimulate, "rewards" which do not reward, punishment which does not punish, and so on.

If we are to fully understand learning and the uniqueness of the individuals who are part of the learning process, it is essential that

we not only become more precise in identifying the components of that process, but also that we allow behavior itself to define the terms. Though we can never duplicate the rigor of a Skinnerian laboratory and maintain controls which would be ideal, we can, in the real world, at least approach such controls – if we try. The IS formula is intended to include all of the various kinds of things which exist in the individual's environment which *might* have an effect upon his behavior, while the DOES part of the formula is identical in structure except that it is composed of those events which have been identified as *having* an effect upon the pinpointed behavior.

Essentially there are five basic parts to the learning environment which are involved in the shaping or building of behavior. The IS formula is shown below.

PROGRAM/ANTECEDENT EVENT/MOVEMENT CYCLE/ARRANGEMENT/SUBSEQUENT EVENT

The PROGRAM portion of this formula includes all those things involved in the overall environmental setting, such as location, time of day, classroom seating arrangements, and so forth. An ANTECEDENT event includes all those factors which *might* result in the behavior or movement cycle and have an effect on the performance of that behavior, such as instructions, curriculum materials, demonstrations, and so forth. The MOVEMENT cycle is the behavior which is being measured, while ARRANGEMENT stands for the numerical ratio between the movement and the subsequent event. For example, one might give one M&M candy for each problem correct, in which case the arrangement would be 1:1, or one hug or statement of praise for each ten problems correct, in which case the arrangement would be 1:10. Finally, SUBSEQUENT EVENTS are those events in the environment which *may* be the result of the movement cycle, and which *may* have an effect on the future occurrence of the movement, such as praise, grades, withdrawal of privileges, smiles, and so forth.

These terms provide a much more accurate initial description of the components of the learning situation. Until we are in the position to evaluate the *effects* of these components on the behavior, it can only be said that each component has the *potential* to change behavior, but has not yet demonstrated that it will do so. Once these components have *demonstrated* a behavioral function, we then have the DOES part of the formula. It is only then that PROGRAM components can be described as DISPOSITION COMPONENTS; ANTECEDENT event components can only then be described as STIMULI; MOVEMENT CYCLES can only then be defined as RESPONSES; ARRANGEMENT components can only then be defined as CONTINGENCIES; while SUBSEQUENT EVENT components can only then be described as CONSEQUENCES. We therefore see a change from the IS formula above to the DOES formula, which follows:

DISPOSITION/STIMULUS RESPONSE/CONTINGENCY/CONSEQUENCE

It may well be that through the development of the IS-DOES formula Lindsley has made a major contribution to education and psychology by reemphasizing the importance not only of precise behavioral definition, but also by calling attention to the fact that there are other equally important components in behavior modification procedures in addition to reinforcement. He has taken the emphasis off "M &M's" and placed it where it should be: on *the total learning process.*

The fourth and final component of the Precision Teaching system is the Behavior Bank. In this technology, as in many others, the computer has its appropriate place. The Behavior Bank is so designed that those who begin to use the Precision Teaching system may "deposit" effective projects in the bank and receive in return the privilege of withdrawing other projects at a later date, thereby making the experience of people in all parts of the world directly available to any member of the bank.

For example, Miss Jones is a depositor in the bank, and she has deposited a number of successful Precision Teaching projects which are credited to her account. In the course of teaching her special class, she runs up against a problem of head banging; and, despite a series of attempts to modify this head banging, she is unsuccessful. She may then, if she so desires, contact the computer bank for help. The computer will search out projects which have demonstrated effective procedures in modifying head banging behavior, making this resource available to Miss Jones. She therefore has readily available the expertise of successful behavior modifiers with specific reference to the exact behavior with which she is concerned. At the present time, the Behavior Bank contains over six thousand behavior projects, which is only a fraction of the eventual storage potential. In this case, then, the computer is used in a highly effective manner in that it stores *successful* procedures on a multitude of problems which can be made readily available to depositors in the bank in their efforts to help children.

WE ARE LONG PAST the time when we can leave the emotional, social and academic education of children to chance. It has been pointed out far too frequently that children are over and over again exposed to a learning process which is not only painful but unproductive, at least unproductive in terms of those kinds of behaviors which we would like to build. Too frequently it is productive in terms of those very behaviors which we would like very much to get rid of. We assume learning when no learning is taking place and sadly have had no definitive ways of verifying whether or not such learning is occurring. It is high time that we begin to demand evidence that we are doing our jobs with children, not only children in general, but Johnny and Mary and Billy and Cathy. The Precision Teaching program provides at least a base for such proof and a means of evaluating what we are doing. It does not tell us what changes to make; that is left to the unique creative capabilities of each teacher. It does, however, provide that teacher with immediate feedback with regard to whether her "creativity" is resulting in a satisfactory product. As numerous writers have pointed out, failure to learn might be more appropriately called failure to teach. If we continue to avoid responsibility for assessing the effects of our teaching skills, particularly when adequate assessment techniques are available, then we are, indeed, the most immoral of practitioners.