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Advanced Behavioral Applications in Schools: A Review of R. Douglas Greer's *Designing Teaching Strategies: An Applied Behavior Analysis Systems Approach*

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R. Douglas Greer's ***Designing Teaching Strategies*** is an important book directed to advanced students in applied behavior analysis for classrooms. This review presents some of the striking features of the Comprehensive Applied Behavior Analysis to Schooling (CABAS®) program and the individualized instruction that the book advances. These include its instruction in literacy, its use of graphing, and its flexibility in systematic organization. Although its readability could be improved, this book has much to recommend it in an approach that has acquired an international following.

Designing Teaching Strategies by Doug Greer is an advanced book on behavior analysis in the classroom with systematic coverage of what is involved in its implementation. This approach is designated as a comprehensive applied behavior analysis to schooling (CABAS®). As the author states, "The book is an advanced text that builds on the coverage of introductory and intermediate texts" (p. xv), and "The reader will need to be versed in the basic procedures of applied behavior analysis" (p. xv). Presumably, this book assumes the knowledge covered by texts such as those by Sulzer-Azaroff and Mayer (1986), or Cooper, Heron, and Heward (1987), which are identified as examples of "[E]xcellent texts that introduce teaching as applied behavior analysis" (p. 165). As might be anticipated from the identification of the book as an advanced text, the book has an extensive employment of technical terms and an extensive glossary, but a less extensive index (no names of authors cited), in addition to being a book for advanced students:

> This book is for teachers who teach all children, not just the children who come to school with much of the teaching already done or the children who begin school without disabilities. Our teachers are those who will be expert with those students who need to be taught in order to learn—students who are difficult to teach! (p. 9)

Accordingly, this book focuses on individualized instruction in classrooms. Cooperative behavior (p. 206), social skills (p. 272), and creativity (p. 199) are addressed within this orientation. The book is the product of the author's some twenty years of experience with CABAS®, which was introduced in the Fred S. Keller demonstration school affiliated with Columbia University Teachers College. This program has now been extended to centers in Ireland, England, and Italy. As indicated in the preface, a standout model of this approach overseas can be found at the Glasheen National School in Cork, Ireland. The following comments, however, are based primarily upon the text *Designing Teaching Strategies* rather than observations of what occurs in these schools.

Among other sources, Greer traces the philosophical background of the CABAS® approach to "behavior selection" and to "pragmatism" (p. 151), in particular the pragmatism of C. S. Peirce (e.g., p. 159). Linking similarities in these approaches to the work of B. F. Skinner, the primary behavior analytic background is traced to B. F. Skinner with a strong emphasis on his analysis of verbal behavior and his distinction between rule governed (or verbally governed) behavior and contingency-shaped behavior (especially, pp. 151–210). Greer appears to support the use of the term *verbally governed,* which indicates a more extensive application than *rule governed* with its seeming restriction to verbal behavior in the form of explicitly or implicitly stated rules:

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> One sees the evolution of what Skinner called "rule governed behavior" or what Vargas and Vargas (1991) called verbally governed behavior. That is, as verbal behavior substitutes for direct contact with the nonverbal environment the behavior of writing may become more abstract. Writing that is directed toward describing real phenomena in real time (e.g., biology, behavior analysis, organic chemistry) must be checked against the nonverbal events or verbal effects on verbal behavior. As students become more sophisticated, that contact need occur less frequently. In the early stages, the verbal behavior must be checked against its descriptions repeatedly. For example, in order for the description of photosynthesis to be an authentic scientific tact, photosynthesis must be observed; without the observation, the student is simply emitting an intraverbal. (pp. 195–196)

Not only the Vargases, but Skinner himself had apparently come to the conclusion that all of the listener's behavior, as a listener, was more adequately distinguished as being *verbal governed* "when he suggested that rule-governed behavior might also be called verbal stimulus controlled behavior" (Hayes & Hayes, 1989, p. 159). There is no reason to regard verbal control (in a probabilistic sense) as stopping at explicitly or implicitly stated rules. For Greer, this translates into a comprehensive coverage of *verbal governed* behavior as it is applied to instruction.

Standout Features of the Program

The following focuses on 3 standout areas of the program, its approach to literacy, its systematic approach to graphing, and the flexibility of its systematic organization. Its approach to literacy is a whole-to-part-to-whole approach with a focus on writing connected text. Its approach to graphing is to use graphing for the development of instruction as well as for the monitoring of student improvements. And its approach to a comprehensive systems analysis is flexible in advancing participatory organization and a step-by-step approach to implementation. All of these are features to be recommended in any program and may be at least partially adopted by teachers in a step by step fashion without immediately adopting the extensive technical terminology that Greer finds integral to his approach and which densely populates his text.

Instruction in Literacy

The flavor of CABAS® applications may be gathered from its approach to literacy. Literacy is addressed with a central focus on developing writing skills that allows an inherent development of reading skills as part of writing. Over time the writing and reading becomes more extensive and complex:

> Initially, words, sentences, or short paragraphs require immediate teacher or peer editor consequences followed by revision. At advance stages, entire chapters or books are written before feedback is given. *The writer is not, however, bypassing a reader, even at the most advanced stages.* What happens is that the writer becomes more adept at functioning as *her or his own reader* and can do so for longer periods of independence. Skinner has described this as the self-editing function of writing. (p. 196)

This is advanced through means such as "a period of time in the daily schedule in which all communication occurs in written form (e.g., the reader responds to the initial writer as a writer also)" (p. 195). Here and elsewhere, progress is assessed through learn units.

> Learn units for teaching self-editing repertoires, as is the case with other learn units, are counted in terms of time and at specific levels of functioning. If the teacher supplies 20 separate comments (e.g., corrections and reinforcements) for a 20 page paper, 20 learn units were provided in the time period involving the assignment period and the return of the paper to the student.... Incorrect responses are corrected or noted and adequate or excellent responses also are noted. Each comment constitutes a learn unit. (pp. 198–199)

Creativity is addressed by "reinforcing variety in the responses that meet the criteria if one of the goals of the instruction is creative responding" (p. 199). The guidelines for the goals in literacy address "mastery plus fluency" (p. 201).

The classroom arrangement for enhancing

the delivery of writing instruction is in strong contrast to traditional group seating:

> The classroom for the independent reader should be arranged with desks such that the teacher and tutors can quickly reach students. Students may be faced away from their peers, preferably in screened carrels with shelves for holding books and materials and workspace for writing and the use of computers or other equipment.... Each student should have his or her own individualized PSI [Personalized System of Instruction] folder with work for the day or period inserted. There may be an *in* basket (for work to be done) and an *out* basket for work that awaits comment from the teacher. Visual displays (graphs) of each subject matter/repertoire are available either in loose-leaf binders or posted or produced on the computer monitor. Each desk or computer should also have a timer for timing responses to instructional tasks (i.e., self-monitoring). Dictionaries and texts should be located at individual carrels or in a central location for ready access. (pp. 203–204).

With the computer, students can primarily produce their writing by means of word processing, and handwriting no longer becomes an issue. Handwriting need not be a prerequisite for producing connected text, and writing does not need to wait upon the development of a student's fine motor skills. For most young children, pushing a button key on a keyboard is a task they can readily accomplish. Another advantage of the computer is that multiple printouts of a student's writing can then be made available for distribution to prospective readers—teachers, parents, relatives, other students, friends, as well as copies for school records. These readers may provide reinforcing comments in one way or another, and a portfolio of writing can easily be maintained. In addition, visual displays of graphs of student performance over time are in three primary locations: loose-leaf binders, posted, or computer monitors. Hopefully, computer-generated graphs of student performances will eventually become a commonplace option for academic work performed anywhere on the computer.

Graphing

A main feature of the CABAS® approach is that the methods it employs are designed to be revised by the data the program generates. This is made possible by a systematic inclusion of the students and teachers in graphing progress over time. This allows the students to be involved in recording and assessing their own progress and the teachers to be involved in assessing and revising what works and what doesn't work in the program, or what works better and what works less well. The teachers thereby become researchers in the methods of the program. The outcomes are specific and demonstrable improvements for the students and research presentations for the teachers, as witnessed by CABAS® presentations at Association for Behavior Analysis meetings.

The omnipresent graphs permit an individualization that is central to the program. Greer suggests that the "continual measurements of the outcomes for each individual student ... distinguishes what the sciences of pedagogy and schooling offer over all other approaches" (p. 11), and this approach is designed for each individual, not for just a mythical group average:

> The body of knowledge on which our science is based is designed for individualized instruction, while the historical approach to public schooling has been based on group instruction *and the selection and separation of students who fail in normative classes.* (p. 10)

Continuous individual measurement allows for individualized instruction. Graphing is pursued without confinement to graphs with a semi-log scale such as the standard celeration chart that is required in Precision Teaching.

> Advocates for the use of the standard celeration chart point out the usefulness of a standardized visual display. Critics point out that the differences between lines are of a rank order nature; the behavior of interest is not the center of the display, preinstructional performance is not represented, and the measurement does not include the teaching process per se. (pp. 328–329)

The focus of the standard celeration chart is on rate or fluency. Although fluency is a central concern in the CABAS® approach, other kinds of information about performances, such as learn units, are also of interest.

Curiously enough, there are no illustrations of actual graphs in this book although the uses of graphs are integral to the program at many levels. Further, considering that Greer makes frequent reference to the scientific basis of his applications, he is missing an opportunity to pursue a practice that would align his text with the texts of more prestigious sciences—the use of graphs in the text. A recent article by Smith, Best, Stubbs, Archibald, and Roberson-Nay (2002) in the *American Psychologist* made a convincing case that it was the more frequent appearance of graphs (not tables) that characterized the publications of the more prestigious sciences; and graphs would enhance the resemblance between this book and those science texts.

A long tradition of graphing exists in many areas including education (Moxley, 1989). Carlton Washburne (1922), an associate of John Dewey, recommended that students measure their own performance and keep "definite records of their improvement from day to day" (p. 203) and John A. O'Brien (1926) found, "The direction of slant of the line tells the whole story.... The pupil becomes determined to 'make that line go up,'" and concluded, "The individual graph made one of the strongest appeals to the pupils and proved one of the most effective instruments in stimulating their speed in reading" (pp. 74–75). The use of graphs for improving instruction, as in the CABAS® approach, however, was not then appreciated, and student self-graphing has never become a routine component of instruction in most American schools. Perhaps a fuller development of graphing, as in CABAS® classrooms, is needed before a more extensive emulation of graphing occurs.

Flexibility in Systematic Organization

A striking feature of the CABAS® approach is its flexibility, which may help to account for its successful adoption in schools overseas. The CABAS® approach supports continual revision. No stage or variant of the program is to be considered as fixed or final: "Design or redesign must be followed by empirical tests that lead to revision after revision" (p. 246). This allows an evolutionary approach to the program as issues arise and are adjusted to. An evolutionary approach of this kind is furthered by participatory organization and a step-by-step approach to implementation.

Participatory organization. An emphasis on two-way participatory interactions extends throughout the program. Students are involved in setting their own objectives, and staff members are encouraged to "contribute to the objectives of the school" (p. 242). The overall application of this community of participation is extensive: "This notion of *participatory management* must pervade the management of instructional and administrative personnel" (p. 243). This entails a bottom-up rather than a top-down approach to administrative decision-making: "In each case, the design of the administrative and supervisory model must be decided based on student learning effects rather than the inertia of traditional top-down approaches to administration" (p. 244).

A step-by-step approach to implementation. CABAS® also supports a successive approximation approach to implementation. In contrast to all-or-nothing commercially packaged programs that seem interested only in having users purchase the whole package, the CABAS® approach offers an implementation in stages: "In some cases, the initial efforts may only be done with one or a handful of receptive teachers" (pp. 245–246), and steps for introducing a CABAS® approach into a teacher's classroom are shown in Table 2 (p. 269). This table is headed "Steps for Psychologists to Use to Introduce Behavioral Pedagogy to Classroom Teachers." Obviously, supportive personnel are invaluable for steps leading to a full CABAS® implementation. But some ideas are there for the taking, such as the omnipresent graphing which can begin with one student's progress in one area. Graphing is a broad field and may be extended to embrace checklists as well as frequency counts in education, with checklists focusing on step by step accuracy and frequency counts on fluency although each may serve functions associated with the other. A teacher may begin simply with whichever form for graphing student performance is found convenient. Student self-graphing of progress can be undertaken with either kind of graph. Steps for teaching students to graph the performances of other students in a tutoring relationship and for self-graphing their own performances are given on pages 135–137. Although graphing student progress is not exclusive to CABAS® classrooms, it is a good place for teachers to

begin if they would move toward such a classroom. In a sense, the steps toward a CABAS® approach may be organized around the data generated by the graphing.

Suggested Changes for the Next Edition

The overall recommendations in this book are sound and consistent with an applied behavior analytic approach. The few questions I had about the content were in the nature of interpretations that could be cleared up with a clarifying example. Otherwise the questions I had were small and few. In discussing the fading out of prompts, the author gives as an example "the systematic fading of the number of dots ... until letters are formed with no prompts" (p. 72). However, I have seen young children connect dots by producing irregular, jerky connections that are different from the strokes needed in letter formation; and, as the dots are faded out, some strange connections are produced. The game becomes connect the dots rather than replicating letter forms, and there are other alternatives for developing letter formation skills in young children (cf. Moxley, 1982). Actually, if children begin with developing keyboarding skills and use the computer for developing further writing skills, they do not need to develop letter formation skills by hand as a prerequisite for producing connected text. Handwriting can wait upon the development of fine motor skills when copying a letter form is a much easier task.

A more serious problem is not the content but the form of the presentation. Even for an advanced text, this book is more difficult to read than it needs to be and would benefit from more proofreading corrections to eliminate mechanical errors (incidentally, where needed, the quotations from the book in this review were given such corrections). The book would also benefit from more clarifying examples that would anchor terms to a context of specific instances. There should be more illustrations to show in more specific and concrete detail what learn units are. I was still unsure of the relation between learn units and reinforcement. What was the relation between a response consequence determined by simply saying "correct" after a performance and reinforcement as shown by an increase or maintenance of that performance on the graph? For further clarification, I would have liked specific examples of graphs showing learn units counted and recorded for both beginning students and advanced students. There should at least be some graphs somewhere, perhaps in an Appendix. Without such changes, readers are left to make their own corrections to the text and to supply their own examples of instances. This can soon become exhausting.

Also, toward the goal of developing the CABAS® approach as a model for emulation, I would recommend the production of a film or videotape of on-going activities at one or more of the centers. This would go a long way toward providing more examples and concrete details. Public distribution of such a video should also go a long way toward raising awareness about CABAS® in the public schooling community as well as in the behavioral community. It would be an important addition to media libraries for schools of education.

Conclusion

Despite the issue of readability, this book on behavior analysis in the classroom has much to recommend in that the integration of behavioral principles is so comprehensive and sound. It offers a highly flexible yet extensive model for applied behavior analysis in the classroom. As such it offers a valuable service for students who are enrolled in a CABAS® school, a valuable development of instructional methods and their delivery, and a valuable training ground for graduate students to become versed in behavior analytic principles in application and to become engaged in applied research. In brief, this is an important book and the best systematically integrated application of behavioral principles for the classroom that I have encountered.

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