The Keller Plan Handbook

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Essays on a Personalized System of Instruction

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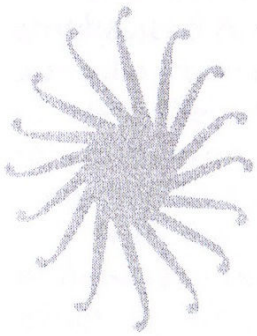

CHAPTER SEVEN

Developments in Brazil

Carolina Martuscelli Bori

In Chapter Six Professor Sherman has noted that PSI in the United States and in Brazil developed in an "independent but largely parallel" manner. To this it might be added that in certain respects the two movements have become more diversified. In this chapter I shall attempt to describe the way that PSI developed in Brazil and to show how this diversity evolved and with what implications.

In August 1963, at the Philadelphia meeting of the American Psychological Association, Professor Keller presented the blueprint of a "more or less imaginary first course in psychology" not yet taught but which was related to the organization of a new psychology department at the University of Brasília (see Chapter Two).[1] This blueprint influenced, and was influenced by, the planning then in progress of an introductory course for that department in which Rodolpho Azzi, Professor Sherman, and I were participating.

[1] F. S. Keller. "A Personal Course in Psychology." Paper read on August 31, 1963 at the Philadelphia meetings of the American Psychological Association. Also in *Personalized System of Instruction: 41 Germinal Papers*, J. G. Sherman, ed., Menlo Park, Calif.: W. A. Benjamin, 1974.

The plan that we were formulating, but which was never put into action, included readings, written exercises, laboratory experiments and reports, data analyses, class demonstrations, and a few lectures. After reading the first assignment, the individual student was to be tested on it. If successful, he could attend a lecture or move on to another unit of the course—say an experimental exercise. And so on, at his own pace, until the course work was completed.

This course, as we designed it, had all of the distinctive features which, later on, Professor Keller would formally present in his paper, "Good-bye, Teacher . . ."[2]—small units of reading matter and short laboratory exercises, communication through the written and printed word, lectures and demonstrations as motivational vehicles, and a relative lack of time requirements or deadlines. There were even tutors in this imaginary course during the laboratory hours.

Another aspect of the course deserves particular mention. The planned sequence of topics to be covered by our twenty units was not to be found in any available textbook. The logical sequence of experimentation, reading, and the like which we envisioned could not be carried out. We were therefore compelled to get material from a variety of sources and then divide this into units. In this process, our original sequence was altered and a new one was dictated, not so much by our real objectives as by the available texts. Such a state of affairs is not uncommon with users of PSI today.

The first personalized course actually taught at Brasília in 1964 was an *Introduction to the Analysis of Behavior* (or IAEC-1) and has been briefly described in Chapter Two. The course contained a fair amount of readings, laboratory exercises, some lectures, and a few demonstrations. The program followed the structure of Keller and Schoenfeld's and Holland and Skinner's textbooks which, by then, had been translated into Portuguese. With each assignment the student received a sheet of paper containing a brief account of the task ahead and its relation to the past one. The laboratory instructions followed the model used by Keller and Fields at Columbia College in the fall of 1963 (see Chapter Two). Such detailed instructions were provided because of the limited experience of Brazilian students with this form of independent work and laboratory study. Data treatment and analysis were equally the subjects of specific instructions, and were kept consistent with the goals of the course that we had originally planned.

One aspect of the Brasília course will suggest the value that we placed upon the laboratory experience: whereas quizzes on the reading were graded by a clerk (with the help of a template!), a graduate stu-

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[2]F. S. Keller. "Good-bye, Teacher . . ." In *Personalized System of Instruction: 41 Germinal Papers.*, J. G. Sherman, ed., Menlo Park: W. A. Benjamin, 1974, Paper No. 1.

dent, specially prepared, monitored the laboratory work of every student. His main function was not related to equipment or procedure, but to data collection and discussions.

Because of the interest aroused in our IAEC-1 and IAEC-2 (which emphasized *human* behavior), the Human Sciences Institute requested a similar course for their students—a shortened version of IAEC-1 and -2. Here the difficulty in selecting texts showed up again. Sequencing raised an even greater problem, since with a shortened course, several steps had to be eliminated.

With the interruption of all academic functions at the University of Brasília in the fall of 1965, personalized instruction in Brazil came to a halt. When it was resumed, a little later, at the Catholic University in São Paulo, it was under very different circumstances and some new ideas. The Psychology Department at that university had not received the laboratory equipment it had purchased, and the experimental emphasis of IAEC could not be implemented. Data had to be separated from procedure in our teaching.

Under such conditions we turned to the experience of Professors Keller (1965) and Sherman (1967) at Arizona State University.[3] We decided to teach the conceptual framework of our course separately from the laboratory practice. This decision affected both the content and the programming of our course. Although students and assistants liked the format, its results were not as satisfactory to us as they had been when the activities of reading and doing were more closely intertwined.

In this same course, another new feature was added. All tests were evaluated, not by a clerk, but by members of the teaching staff. In this process, every answer on a test was discussed with the student in a manner like that described by Keller in 1965 in connection with his treatment of the proctor's function.

These were the first of many changes this course underwent through its use at different colleges and with different students. Some of these adaptations, planned and taught by former tutors at Brasília, kept the principal characteristics of PSI: small-sized units, written communication, alternate test forms, and self-pacing. In the majority of cases, however, the course was borrowed and used because it represented a set of readings selected and adapted for our schools. In fact, most professors were more interested in the content of our course than in our method. Gradually the initials, IAEC-1, took on a meaning more related to a reading list than to the teaching system it originally represented.

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[3]F. S. Keller. "New Reinforcement Contingencies in the Classroom." Paper read at the New York meetings of the American Psychological Association, August 1965, and J. G. Sherman. "Application of Reinforcement Principles to a College Course." Paper read at American Educational Research Association, New York, February 1967.

By this time, our course was very popular in Brazil. Very few psychology courses were as widely used by so many professors at different schools in our country. Its main effect was to introduce laboratory exercises into the routine teaching of psychology (and, of course, the related spread of operant thinking—reinforcement theory). However, it had little influence on the attitudes of these professors with respect to the teaching of courses other than introductory psychology. Very few of those who used IAEC-1 applied a similar format to new and different courses.

As exceptions to what has just been said there were a few psychology courses in the areas of learning, motivation, and social psychology, at both the graduate and undergraduate levels, whose programming, generally speaking, followed the format of PSI. In addition, there appeared within these courses two new features. First, instead of a paragraph or two of introduction to each reading unit, longer, more detailed instructions were commonly supplied. Objectives for the specific unit were stated, suggestions were offered as to use of the material, and information was furnished concerning the nature and criteria of evaluation. As can be seen, these one-page introductions became quite similar, in scope and detail, to laboratory instructions and, in a sense, they were truly study guides.

The second innovation came with the appearance of the interview technique.[4] When verbal (oral) fluency was thought to be important, the model proposed by Charles B. Ferster was often followed, as a condition of learning and as a means of its evaluation. This produced some interesting results, since Ferster's structure permitted the shaping of oral fluency while maintaining the characteristics of PSI. The strategy of alternate tests and interviews offers an added virtue: a break with the repetitiveness of continual reading and testing.

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[4] Editor's note: The interview technique was first used in a PSI course by Dr. C. B. Ferster in an introductory psychology course at Georgetown University in 1967. At the end of each unit, the student finds another student to listen to him describe the concepts he just read. After a limited amount of time, the listener responds to the speaker, commenting on inaccuracies and oversights. The interview is an intermediary step which comes after the student has read the study guide and text and before he has taken the unit quiz. For a more detailed description of the interview technique, consult "Individualized Instruction in a Large Introductory Psychology College Course," by C. B. Ferster, *Psychological Record,* 18, 1968. Reprinted in *Personalized System of Instruction: 41 Germinal Papers,* J. G. Sherman, ed., Menlo Park, Calif.: W. A. Benjamin, 1974, Paper No. 34.

PSI did not immediately find its way into other disciplines. Very few science teachers adopted the system, even though they might have heard about it or seen it in use within psychology departments. Yet there was a climate of dissatisfaction with the state of science teaching in Brazil which showed itself in various ways, ranging from informal meetings and discussions to symposia dealing with the urgent need for methodological innovation. It was in such a context that the Physics Department at the University of São Paulo asked for a course in basic principles of behavior. Such a course was provided, using the Ferster model, and has since been repeated on a number of occasions for students in physics and engineering.[5]

One young man who took this course was Professor I. Iida, of the Polytechnical School at the University of São Paulo. In 1970 he decided to program a course in Human Engineering, based upon the Ferster pattern. Accordingly, the first few interviews on course units were conducted by the professors in charge and, from then on, also by those students who had passed a given unit.

The implications of this course were seen to be great, and the enthusiasm it aroused among the students was even greater. However, the use of students as interviewers led to difficulties as the semester neared its end. With a deadline clearly in sight, the pressure mounted to obtain an interviewer's "pass," and the quality or "noise" in the interviews reached an unacceptable level. In the following semester, this problem was avoided through the use of proctors to carry out the interviews, rather than student interviewers, and in addition, for some units, a written test replaced the interview. Since then, Professor Iida has been responsible for the orientation of several engineering courses, both graduate and undergraduate, at the Federal University of Rio de Janeiro, and now all of the courses employ this same procedure. Professor Iida's work should be of special value, since it represents an inter-departmental effort towards a greater integration of several courses within a technological area.[6]

At about this time in 1972 at the University of Brasília, an introductory course in physics and mechanics was being tried out, using PSI.

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[5] This course was taught by M. I. Rocha e Silva, who had taught a similar course with Ferster at the University of Maryland and was collaborating with the Department of Experimental Psychology at the University of São Paulo.

[6] I. Iida and M. C. Santoro. "Relatório sobre Aplicação do Método de Ensino Individualizado." Escola Politécnica da Universidade de São Paulo, Junho, 1970 (Paper).

Professor L. C. Gomes, of the Physics Department, had become enthusiastic about the system after reading Keller's "Good-bye, Teacher . . ." Shortly thereafter, at the same institution, PSI was adopted for all the introductory courses in chemistry and mathematics. Before long the system had been applied to a population of four thousand students.

The use of PSI in these courses was limited, however, to the theoretical aspects of the disciplines; all the practical activities, such as the solving of mathematics problems and the carrying out of laboratory exercises, continued to be taught in the classical manner. Also, as might be expected, there were trouble-making features of the applications, most of which were related to the selection and training of proctors. It has been our experience that a familiarity with articles on PSI, although an important determinant in deciding upon its use, is not a sufficient condition for solution of problems of administration and programming of a course.

Nonetheless, the physicists continued to use personalized instruction, adding a new feature. At the Federal University of Rio Grande do Sul and at the University of São Paulo, prior to the introduction of PSI on a large scale, the program was used with a smaller class of students. From this group proctors were chosen and carefully trained. In this way, many problems of implementation could be resolved, at least in part.

In other areas of study, such as social science, several attempts have been made to use PSI, although very few have been personalized all the way. Courses in sociology, anthropology, geography, history, philosophy, and foreign language have employed certain features of the system—small study units and frequent testing, for example—but they have rarely used the plan *in toto*.

Unfortunately, too, in no area of study (psychology, physics, or other) has permission been granted by administrative officials for students to complete their courses outside the rigid limits of the academic semester. Nor has there been an adoption of the alternative solution—the adjustment of course materials or sequence of activities within the established course duration. Consequently, these courses give the impression of being somewhat more teacher-paced than student-paced, and frequently this has brought about changes in mastery criteria and/or repeated testing possibilities.

Gradually the main difficulties related to the use of PSI in Brazil have shifted from those of course content to those of personnel training. There are enough textbooks and other reading matter to select from. Instructors have developed reasonable proficiency in preparing and presenting such materials—but the fine points of programming and actual course administration continue to suffer from inadequate know-

ledge and experience. These concerns attested to the need not only for skill in preparing materials and solving practical problems, but for an understanding of the principles underlying PSI.

Two workshops, given during 1972 and 1973 at the Federal University of Goiás and at the Federal University of Bahia, included among its participants a majority of social-science and education professors. These workshops involved, in addition to readings on the major features of PSI and on the making of decisions as to the terminal behaviors sought for, a series of readings on the principles and procedures essential to the effective understanding of programming techniques and PSI logistics. Each member of the workshop group was required to program a course and write its first few units. Since the workshop itself employed the format of PSI, the participants had an opportunity to experience its contingencies and occasionally to serve as proctors. Although this does not completely provide the actual experience of giving a PSI course, it is a good approximation.

Another kind of training has also been tried. This relates specifically to teaching a small group of people, in a short period of time, to plan and write remedial courses on technical subjects.[7] The great success of such training appears to be attributable to the fact that all participants completed their training by actually serving as proctors in the later operation of their courses. We have not yet analyzed the implications of this procedure, but it currently seems to us that the opportunity to prepare a course is not in itself sufficient to assure its later success. It is worth noting, however, that even when the workshop organizer does not check up on the course that is later taught, the results are highly satisfactory: the participants are completely able to plan a course and prepare its material, obeying all the major rules of the PSI format.

Parallel-wise, it has become increasingly clear to us, from analyses and discussions in our "Seminars on PSI" at the University of São Paulo, that "although an elaborate and complicated affair, a system of teaching is presumably reducible to a set of three-term contingencies."[8] It seems to us that if the development of PSI as a system of teaching initially emphasized the format, later on it should increasingly depend upon the potentialities and degree of specification inherent within the learning principles it is derived from.

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[7]This investigation was sponsored by CENAFOR, a federal government center for the furtherance of professional training.

[8]This is taken from F. S. Keller's *Discussant's Comments* at a symposium on Personalized Instruction, in the August 1971 meeting of the American Psychological Association in Washington, D.C.

Some research in Brazil is currently moving in this direction. The starting point has been a detailed analysis of the activities essential within the program of a course. Such analysis involves a thorough examination of the antecedents of which the specific behavior is a function, the behavior itself, and its consequences. Since the three-term contingency is now our unit of study, the activities themselves no longer maintain their identity. Our work increasingly becomes a study of contingencies.

Plainly speaking, we no longer teach people to program courses, but to search for contingencies within activities, and program *them*. The more elaborate the programming, the more detailed the analysis of the contingencies most frequently found, for example, in laboratory experiments, in graphing, interviewing, reading, writing, and so on. The work already done suggests that the choice of the activities within a course should not be a matter of secondary importance. It could well be one of the principal reasons for the course's success or failure. In other words, the programmer should put into his courses those activities which provide the students with the most opportunities to emit the behaviors of interest. It can be noted, as an example, that *reading* activity, under such analysis, becomes less of a vehicle for content and information and more of an instrument for acquiring behavior.

Disciplines which are programmed with terminal behaviors clearly defined and which employ the results of an analysis such as that outlined above would seem to be an interesting development of PSI. At least they represent a more ambitious stage or programming tactics. The PSI format is followed in such courses, but what is changed within its logistics are the determiners of sequencing.

This concern, reflected in our analyses by the choice of activities within a program, has determined new paths for research on PSI in Brazil. The positive findings in terms of achievement, preference, and students' attitudes towards PSI in more than one country are sufficient to establish the format as an important contribution—worth knowing, keeping, and using. But the implementation of the system calls for more research on the procedures to be used in the evaluation of student performance as determined by the programming contingencies. This evaluation should not be made in terms of subject-matter mastery, but should be based upon the analysis of stimulus conditions and behavioral consequences, with respect to the behavior of the students, the proctors, and the professors themselves.