CHAPTER 13

Issues in Curriculum Development

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Numerous educational intervention programs have been developed over the past three decades to teach students with autism and other severely handicapping conditions the language, self-care, vocational, and social skills they lack. Typically, such programs are based either on developmental theory (Flavell, 1965; Piaget, 1952, 1960) or on an ecological perspective (Bronfenbrenner, 1979; Swap, Prieto, & Harth, 1982). For more than a decade, one educational debate has centered on determining which of these two models—developmental or ecological—offers the most appropriate framework to use when creating intervention programs for autistic and other severely handicapped students. A secondary debate has focused on the methodology used for curriculum implementation, with behaviorists (e.g., Koegel, Rincover, & Egel, 1982; Lovaas, 1977, 1982) in one camp and advocates of a less-structured approach (e.g., Duchan, 1986) in the other.

Unfortunately, an "either-or" dichotomy presently exists in both the content and methodology areas, despite the fact that rigid adherence to a singular position in either area is inappropriate and replete with problems. The purpose of this chapter is to review some of the advantages and disadvantages of both sides of the curricular and methodological debates and to suggest some solutions that extract the most positive elements of each approach. Much work has already been done in this regard, both empirically and theoretically, in the area of language intervention programs (e.g., Miller & Yoder, 1974; Miller, Yoder, & Schiefelbusch, 1983; Schiefelbusch & Bricker, 1981). Although language issues are addressed, the aim of this chapter is to provide a general discussion of the issues. The description and evaluation of the various models is not intended to be an exhaustive review.

THE CONTENT DEBATE: WHAT TO TEACH

The Developmental Approach

Most developmental curriculum models have been derived from the work of Jean Piaget and his colleagues (Piaget, 1952, 1960; Piaget & Inhelder, 1969), who described cognitive development in children. Although individual models vary widely in the degree to which they emphasize Piagetian principles, these models share several key concepts (Weikart, Rogers, Adcock, & McClelland, 1971):

1. There is a sequence to mental growth.
2. This sequence is invariant.
3. Earlier steps in the sequence prepare for and provide the base for later steps.
4. This sequence is always in the direction of simple to complex and concrete to abstract.

5. Although earlier stages of the sequence are prerequisite to later stages, they are never entirely displaced by them.

When the developmental model is used to make curriculum content decisions, such decisions are typically based on the usual sequence by which nonhandicapped children develop. Thus, particular attention initially is paid to accurate assessment of the developmental level of the student. This is usually accomplished by use of the same standardized assessment tools utilized with nonhandicapped children (e.g., Alpern & Boll, 1972; Bayley, 1968; Cohen & Gross, 1979; Gesell & Amatruda, 1942; Uzgiris & Hunt, 1975) or by, assessment tools especially adapted for use with handicapped populations (e.g., Schopler & Reichler, 1976; Seibert & Hogan, 1981). Once the student's initial developmental level has been determined, an educational program is designed to move him or her along the developmental continuum. Such a program is designed both to provide a variety of experiences related to a particular concept and to provide activities that are just slightly more advanced than the child's current level of functioning. As the child accommodates and assimilates (Piaget, 1952) new information, the activities are altered slightly so that the concepts presented are slightly beyond the comprehension level of the child, creating a "disequilibrium" and providing a new challenge.

Advantages

Developmental theory provides the educator with information about the scope and sequence of normal child development. Piaget (1952, 1960; Piaget & Inhelder, 1969) meticulously documented the activities engaged in by children of various ages, and subsequent empirical studies have confirmed many of his observations (Brainerd, 1978). These observations provide the educator with a readily available body of information to use when making decisions about teaching strategies. According to developmental theory, this is important because educational activities "must not be too redundant with previous objects or events nor so novel that the child cannot assimilate them into his or her current cognitive organization. In fact, if objects or events are too different or novel, then the (child) may show distress or fear" (Bricker & Carlson, 1981, p. 482). Thus, one advantage of using developmental theory as the basis for making curricular content decisions is that the educator can be assured of providing the student with activities that appropriately challenge his or her cognitive and conceptual abilities.

In addition, developmental theory holds that the optimal condition for generalization occurs when the discrepancy between a newly acquired skill and the existing skill repertoire creates a "just tolerable (conceptual) disequilibrium" (Kagan, Kearsley, & Zelazo, 1978). This disequilibrium serves to maintain the student's interest by providing a challenge, and at the same time it allows the student to compare new experiences with similar experiences already in his or her repertoire. Some authors have suggested that the generalization problems experienced by students with autism and other severe handicaps might be minimized if curricular content decisions were based on normal developmental sequences that ensure the appropriate degree of disequilibrium (Bricker & Bricker, 1974; Miller & Yoder, 1974).

Disadvantages

Although the developmental model makes

"While assimilation involves changing incoming information, accommodation involves changing the structures used to assimilate information" (Brainerd, 1978, p. 24). Brainerd also says that "perhaps the best way to think of . . . assimilation is as an interpretation of information that is made by the individual" (p 24).

when the model is applied in education. This is due in large part to the complexity of Piaget's writings, which are predominantly descriptive and theoretical in nature. The typical educator who attempts to make an applied "translation" of Piagetian theory into curricular content, therefore, faces a formidable task.

One unfortunate strategy that has been used to translate Piagetian information into the classroom involves extracting items from developmental assessment tools and using them as the content basis for daily instruction (Donnellan, 1980). For example, many assessment tools contain tasks that require the child to find an item hidden under a cup as an indication of the child's acquisition of the concept of object permanence. Similarly, means-ends concept formation might be assessed by asking the child to pull on one end of a blanket in order to obtain a favorite toy placed on the other end. Unfortunately, educational programs often suggest that such activities should be included in the curriculum and taught to students who have "failed" these assessment items (e.g., Shearer & Shearer, 1972; Stephens, 1977). This inappropriate use of developmental assessment information results in the teaching of isolated skills that are quite useless to students in the context of everyday life.

Another problem in the use of developmental sequences is the misapplication of the principle that earlier stages are necessary prerequisites to later stages of development. The curricular sequences derived from this principle usually begin with skills acquired by very young nonhandicapped children and progress to more advanced skills that are typically acquired later. Unfortunately, this approach often means that students with autism are taught tasks appropriate only for young children, since they are "not ready" for more sophisticated tasks. This "slavish adherence to a developmental framework" (Callias, 1978, p. 456) has resulted in the production of hundreds of "pre-" curriculum programs (e.g., those labeled prevocational, preacademic, predomestic, prelanguage, etc.). Unfortunately, the ultimate result is often that adults with autism, having never advanced past the "pre-" skills, have no alternative but to live in "prehomes" (institutions) and to work in "prejobs" (sheltered workshops).

The Ecological Approach

An alternative strategy for organizing curricular content has been suggested by Brown and his colleagues (Baumgart et al., 1982; Brown, Branston, Hamre-Nietupski, et al., 1979; Brown et al., 1980; Brown, Nietupski, & Hamre-Nietupski, 1976). This strategy sidesteps developmental sequences in favor of an ecological approach to curricular decisions. Such an approach requires that the curricular content selected will ultimately and directly enhance the ability of students with autism to function in a variety of domestic, recreational/leisure, general community, and vocational environments. The use of this framework for organizing curricular content has been referred to as the "domain strategy" (Brown, Branston, Hamre-Nietupski, et al., 1979); it is discussed at length in chapter 15 of this volume. A rationale for this approach was offered by Brown, Branston, Baumgart, et al. (1979):

> A 19-year-old severely handicapped student is not developmentally equivalent to a four-year-old nonhandicapped student, even if testing procedures assign them both exactly the same developmental age, mental age, social age, etc. A 19-year-old severely handicapped student can and must be taught at least to participate in as many of the activities in which non-handicapped 19-year-old persons engage. Thus, the skills necessary to participate as much as possible in chronological age appropriate activities must be **a** primary consideration when curricular content for severely handicapped students is being generated. (p. 57)

Advantages

The primary advantage of using an ecological approach is that it maximizes the

probability that students with autism will be taught to perform the functional skills necessary for them to live, work, and play in regular community settings as adults.[2] No assumptions are made that students will transfer skills learned in school to nonschool environments or that students will grasp global concepts that can be used in a variety of ways (Donnellan, 1984). Therefore, nonschool instruction is offered in community settings to teach the actual skills the student is required to perform in those settings.

Further, functional skills are taught as students require them, rather than as developmental or other such check-lists dictate. Thus, an ecological approach ensures that curricular content decisions are based on individual student and parent needs, preferences, and goals. Because every effort is made to design individualized educational programs that are chronological-age-appropriate and functional, a variety of skills that reduce the skill discrepancy between students with autism and nonhandicapped persons are taught. Presumably, this will help to foster interactions between students and their peers.

Disadvantages

Although the ecological model does not have the aforementioned problems associated with developmental curricula, other concerns needs to be addressed. First, the lack of regard for developmental information can result in the teaching of skills that are too sophisticated for students' cognitive abilities. For instance, an ecological inventory (Brown et al., 1980) might reveal that a student needs instruction in ordering food from a restaurant menu. This requires that the student be able to select foods from various menu categories (e.g., entree, side order, beverage, dessert, etc.). If the student is functioning below the preoperational stage of development, the use of this classification rule is probably more sophisticated than the student is prepared to appreciate and may result in failure, frustration, and possibly even in inappropriate behavior. Fortunately, strategies for designing individualized adaptations of skill sequences, rules, and materials have been suggested by several authors (e.g., Baumgart et al., 1982). Such adaptations are an integral part of ecologically derived curricula, and when used properly, they help to counteract this disadvantage.

Second, the ecological approach is usually used to determine the activities or skills rather than the concepts that deserve instructional attention (Miller & Yoder, 1974). The effect of this can be that students learn to perform skills in one environment, using one set of materials, but are not able to generalize the skills to novel environments and novel materials (Donnellan & Mirenda, 1983). Ironically, this is the very problem the model seeks to avoid, since those who work from an ecological perspective treat the generalization difficulties of students with autism and other severe handicaps as indigenous to the disorder and seek to circumvent that problem by teaching only useful skills in natural environments with natural materials. Finally, and perhaps most importantly, ecologically based strategies have often been implemented in a manner that does not provide sufficient opportunity for the student to develop in those areas having to do with the "semiotic function" (Piaget & Inhelder, 1969).[3] According to Piagetian theory, the development of this function is directly related to the development of symbolic play, graphic

[2]Donnellan (1980) asks the question, "If the child does not perform the skill, will someone have to do it for him?" as a way of judging the functionality of the skill (p. 71).

[3]Piaget and Inhelder (1969) use the term *semiotic function* to signify "the ability to represent an object, event, conceptual seheme, etc. . . . by . . . language, mental image, symbolic gesture, and so on" (p. 51).

representation of images, verbal language, and socialization skills—all of which present serious difficulties for autistic students in particular. Thus, a student taught from an ecological model might learn to perform a variety of functional, chronological-age-appropriate tasks, but might not learn the related language, social, and other representational skills that would enhance general functioning. A number of articles have addressed this issue in the area of language learning during the past decade (see Bricker & Bricker, 1974, for a review). To date, there has been no resolution of the language debate, which centers around whether language should be taught to students following the normal developmental sequence (Miller & Yoder, 1974) or following a sequence of functional properties of language sequences (Guess, Sailor, & Baer, 1974, 1977). If the developmentalists are correct, the instruction of ecologically determined language content, which is typically divorced both from a developmental base and from a symbolic context, may be an exercise in futility in terms of its impact on the generative language capabilities of students with autism. The same might also be true or other representational areas (e.g., play, social interaction, etc.).

THE PROCESS DEBATE: HOW TO TEACH

The Interactional Model

Like the developmental model used to make content decisions, interaction-based intervention strategies are based on Piagetian theory about how children learn. Most of the theoretical and applied information about this model has come from early language intervention studies with normal and impaired populations. Interaction-based strategies for teaching language and other skills to students beyond the preschool age have been extrapolated primarily from studies investigating mother-child interactions (see Chapman, 1981, for a review). Some of the basic methodological tenets of an interaction-based model of intervention are as follows:

1. The referent event to which the student is attending should be visible (at least initially) and should have highly salient features. The materials in use can then act as "natural cues" to elicit responses.
2. Training objectives should be coordinated across related domains of behavior and not compartmentalized into isolate domains.
3. Environments should be arranged to encourage and promote interesting experiences that involve students in an interactive, not just a passive, respondent manner (Miller & Yoder, 1972, 1974).
4. The pace, form, and function of training should be student-imposed rather than adult-imposed. As Bricker and Carlson (1981) noted, this does not mean a "laissez-faire environment in which the child has complete freedom" (p. 505), but rather that the student should be active in determining and controlling the direction of the activity. Teachers are seen as "facilitators" (Bloom & Lahey, 1978) who accommodate themselves to the student's intents rather than control the interaction (Duchan, 1986).
5. Whenever possible, tasks should be selected that are inherently motivating and reinforcing to the student. Conn-Powers (1982) suggested that this means the teacher should virtually never suggest that students engage in activities that do not complement, acknowledge, or extend their expressed interests.
6. Feedback should be directive rather than corrective; that is, if students make incorrect responses they should be directed to more appropriate responses ("Can you think of something else we might call that?" "What's another word you could use?" etc.)

rather than simply corrected ("No, it's not a cup. It's a spoon." "That's the wrong one. Try again."). In addition, the teacher should refrain from asking questions to which there is a known "correct" answer; questions should be more open-ended and subtly directive (Conn-Powers, 1982). The goal is not that students must be immediately correct, but that they actively participate and gradually move toward more conceptually sophisticated responses.

7. The teacher should capitalize on spontaneous incidents in which students are actively involved. This "incidental training" approach (Hart & Risley, 1975, 1980) and related approaches that also emphasize loosely structured instructional strategies have only recently received empirical attention (see Carr, 1986).

Advantages

A major advantage of the interaction-based approach is that it allows the educator to build on and expand on existing skills in a systematic fashion. (See McLean & Snyder-McLean, 1978, for a more complete discussion.) Behaviors are "scaffolded" (Bruner, 1975) through the use of strategies that acknowledge and support existing behaviors while extending those behaviors. Miller and Yoder (1974) quote Slobin as summarizing the approach as one in which "new forms first express old functions" and "new functions are first expressed by old forms" (p. 522). Thus, instruction is designed to capitalize on the child's existing skill repertoire.

Another positive aspect of the approach is its emphasis on the use of naturally occurring opportunities for instruction. Because the form of instructional sessions is student-directed rather than adult-imposed, the educator is challenged to use naturally occurring events as opportunities for instruction and to incorporate such events into the overall program. The result may be that functional skills are routinely taught in context and supported by the "naturally occurring contingencies of reinforcement" (Stokes & Baer, 1977) that can be expected to operate in such contexts. Ultimately, this may result in more normalized opportunities for practice and enhanced generalization.

Finally, there are clear advantages to an instructional model that places students with autism in an initiative rather than a respondent role. Traditionally, students with autism have been educated in highly structured, often one-to-one instructional settings, in which emphasis is placed on accurate performance rather than on spontaneity (Donnellan, 1980; Donnellan, Mesaros, & Anderson, 1984-1985). The result is often that students learn to produce responses to questions or commands ("What is this?" "Touch the [noun]") but do not become proficient at asking questions or initiating other types of interactions themselves (Donnellan, 1984). An interaction-based instructional model, however, is geared to encourage the child to control and initiate events rather than simply to respond to adult instructions. Presumably, such an instructional strategy should produce students who are more competent initiators and communicators.

Disadvantages

There are several problems inherent in using this approach with students who have autism. These are due primarily to the combined effects of three factors. First, the approach assumes that the student is already acting on the environment in some way and is concentrating on shaping and refining these actions. Many students with autism have extremely limited response repertoires, however; they may not attend to any but the most exaggerated and tangible consequences, and they may be only minimally "tuned

in" to the environment, no matter how creatively it has been arranged. Bricker and Carlson (1981) admitted that "a child-focused orientation is less applicable to the severely handicapped" (p. 505) for the above reasons. Second, as previously stated, the model has been formulated as an educational solution to language delays in very young children. To date, there is little empirical information about the efficacy of this approach in teaching other types of skills (i.e., self-care skills, recreation skills, reading, writing, math, etc.). Furthermore, there are few curriculum guides that incorporate these guidelines either to teach nonlanguage skills or to teach older (i.e., adolescent) students. The result is that educators who might embrace the theoretical principles of the interaction-based approach face the formidable task of translating into practice principles formulated for young, minimally impaired students. Finally, even if these factors are circumvented, the approach presents numerous logistical problems to the educator (Baer, 1981b). One teacher who has used the approach effectively to teach language and other skills to preschool-aged developmentally delayed students estimated that for every 2-1/2 hour school day, she spent an average of 4 hours of planning time (J. E. Davis, personal communication, November 14, 1982). In addition, the "on the fly" (Bricker & Carlson, 1981, p. 505) nature of the intervention makes accurate data collection extremely difficult, because of the unanticipated nature of the teaching opportunities. There is little empirical information addressing issues related to training educators to use the model; however, the information that exists indicates that it is a difficult strategy to teach to student teachers (Conn-Powers, 1982) and auxiliary personnel (J. E. Davis, personal communication, November 14, 1982). Although the model makes sense in theory and is appealingly humane in principle, the problems in implementation may significantly reduce its applicability to students with autism at this point in time.

The Behavioral Model

Whereas the interactionist model is based on data about how children develop and learn from normal mother-child interactions, the behavioral model is based on the position that if developmentally delayed students were going to learn in developmentally normal ways, they would have done so already (Reichle, Williams, Vogelsberg, & Williams, 1980). This model is based on the principles of operant conditioning (Ferster & Skinner, 1957; Skinner, 1957) and emphasizes the use of carefully sequenced, highly structured strategies for instruction. The approach has been extensively researched with severely handicapped students with various diagnoses, and it has been remarkably effective in teaching a variety of language and nonlanguage skills to such students (Baer, 1981b). A behavioral approach emphasizes the following strategies:

1. The student's present level—not of cognitive development but of response performance—is assessed initially using an objective, data-based measurement system. Observable and measurable behaviors are the focus of this assessment.
2. Once skill deficits have been isolated, skills are broken down into their individual components, and a series of objectives is developed to teach the specific behaviors involved.
3. Feedback to the student is accomplished primarily through the manipulation of consequences that are either naturally or artificially available (Kazdin, 1975). Correct responses are followed by consequences that are in some way pleasurable to the student and that result in an increase in the probability that the target response will reoccur. Incorrect responses are fol-

lowed by consequences that are at least minimally aversive to the student and that result in a decrease in the rate of those responses.

Advantages

There are a number of advantages to the behavioral model, particularly in regard to the reliance on systematic, empirically based technology and attention to precise instructional presentation. For example, correct responses are facilitated by the use of carefully sequenced verbal, physical, or other types of prompts (Donnellan-Walsh, Gossage, LaVigna, Schuler. & Traphagen, 1976; Falvey, Brown, Lyon, Baumgart, & Schroeder, 1980; Koegel, Russo, & Rincover, 1977); shaping techniques (Kaufman & Snell, 1977; Lovaas, 1977, 1982); discrimination learning (Gold & Scott, 1971; Zeaman & House, 1963); chaining procedures (Martin & Pear, 1978); and errorless learning strategies (Gold, 1974). Likewise, the educational environment is systematically engineered to reduce the number of irrelevant stimuli available and thus to maximize the probability that the student will attend to the specific task being taught. In addition, the behavioral method exhorts the educator to arrange antecedent events that will be sufficiently salient to elicit the correct response. For example, the teacher might use concise, explicit directions to the student ("Touch the cup," "Say 'ball'," etc.), at least during initial instruction. The combined effect of such practices is that students with autism, who generally experience a great deal of difficulty learning, are able to acquire new skills rapidly and efficiently (Koegel, Rincover, & Egel, 1982).

Disadvantages

There are three main areas of concern regarding the behavioral model. They relate to generalization, to spontaneity, and to the episodic and potentially content-free nature of instructional interventions.

Although it has long been acknowledged that new skills (e.g., receptive language skills, self-care skills, leisure skills, etc.) can be acquired quite rapidly when sound behavioral technology is used for instruction (Donnellan, 1980), generalization of these newly acquired skills has been a problem from the very beginning of applied behaviorism (Ferster & Skinner, 1957). Students with autism typically do not demonstrate either stimulus generalization (the ability to perform in the presence of novel materials, environments, personnel, and/or cues) or response generalization (the ability to apply newly acquired skills to other, conceptually similar situations [Donnellan & Mirenda, 1983]). This generalization difficulty may be a technological problem that can be directly traced to the rigid use of a stimulus-response paradigm. That is, the highly structured and often artificial nature of instruction provided from a behavioral framework may be a deterrent to generalization to less structured environments and naturally occurring stimuli.

A related problem is the lack of emphasis on spontaneity and initiation by the students in many behaviorally oriented classrooms (Donnellan, Mesaros, & Anderson, 1984-1985). Typically, the activities and interactions in highly structured behavioral classrooms are adult-directed rather than child-directed. A precise schedule of activities is usually planned in advance, with specific goals and objectives predetermined for each student. Thus, students progress from one activity to the next at the teacher's discretion, rather than on their own initiative. Because the focus of intervention is very much on the quality of the student's response (correct/incorrect), students almost inevitably become "responders" who exhibit little spontaneous, interactive behavior. Likewise, tasks are chosen that are likely to fit into these rigid schedules. Thus, there is a time-determined rather than a performance-determined progression through the curriculum.

Finally, the task-analytic approach typically used to sequence and develop objectives can result in the teaching of isolate tasks that are not interrelated and that may be devoid of functional meaning for the student. Behavioral technology has often been used to teach curricula derived from a developmental model in an attempt to ensure that the tasks being taught are at least related to the child's level of cognitive understanding. In general, although behavioral techniques are comparatively more clear-cut than interaction-based strategies, they have often been used in ways that minimize the creativity, flexibility, spontaneity, and generalizability of both teacher and student behavior.

The models typically used to make content and methodological decisions for the education of students with autism seem to represent two ends of a continuum. On the one end are the developmental and interaction-based models, which emphasize normal developmental skill sequences and teaching styles. On the other end are found the ecological and behavioral strategies, which are based on functional utility and efficiency rather than normal child learning processes. Unfortunately, these divergent approaches have been considered to be mutually exclusive, when, in fact, they need not be, either on a conceptual or on an applied level.

A CURRICULUM-CONTENT "MARRIAGE"

The "marriage" of the developmental and ecological models for determining curriculum content can be accomplished in two ways. First, the developmental model can be used as the foundation for deciding "what to teach." Second, the ecological information can serve to refine developmentally based decisions or vice versa. Both of these strategies are presented below.

The Developmental-Ecological "Marriage"

This model emphasizes the selection of curricular content that is developmentally appropriate. Ecological information about the student's age and the current and subsequent environments in which he or she can be expected to function is then used to modify and supplement educational activities so that they are age-appropriate and potentially useful.

A developmentally based strategy that utilizes ecological information might be particularly useful for generating curricula to teach the complex language, social, and other representational skills not systematically addressed by the ecological model. The advantage of using both models to plan language and social skill programs is that together they offer a broad base for embedding new skills and concepts in functional, chronological-age-appropriate contexts. For example, students with autism have been noted to have few contact-seeking behaviors (Ricks & Wing, 1976); poor functional use of language (Fay & Schuler, 1980); poor discourse maintenance skills (Halliday, 1975); minimal ability to "decenter," or take the listener's view into account (Ricks & Wing, 1975); and poor understanding of cause and effect relationships (see chapter 29 of this volume). A thorough developmental assessment would yield much valuable information about the related problems an autistic student is likely to encounter in social situations. Activities could then be planned to teach functional, chronological-age-appropriate skills while exposing the autistic student to social situations just slightly above his or her present level. For example, one such activity might involve a cooking task that requires students to make tacos for each other (Kilman, 1982). In such an activity, students could stand next to each other in an "assembly line" fashion, facing their partners on the opposite side of the table (simple contact-seeking

behavior). Functional language use and discourse maintenance skills could be taught in the context of exchanging information about preferred ingredients; this would also require that the student "decenter" enough to take the partner's point of view into account. There would be an obvious end point to the task—completion of the tacos—which would aid in establishing the cause and effect concept. Virtually any functional activity aside from a self-care skill could be adapted to foster social interaction and communication skills by the use of similar developmentally based strategies (see Mirenda, 1983 for examples).

The Ecological-Developmental "Marriage"

In the above example, skills were first targeted for instruction using developmental information as a basis and then were then adapted to the use of real materials in functional, chronological-age-appropriate ways. The opposite strategy can also be used: deciding on activities based on an ecological framework and refining the curriculum using developmental information. Consider a 17-year-old student with autism who is learning janitorial tasks at a vocational site. Developmental information might be useful in establishing priorities regarding tasks that would offer the student the most functional and conceptually meaningful experiences. For example, if the student is functioning at Sensorimotor Stage 5, he or she may not have a sophisticated grasp of means-ends relationships. Unless his or her actions result in very obvious object transformations, the student may not recognize the end point of an activity, and will either terminate it early or endlessly perseverate. This developmental information might lead the teacher to target certain skills for initial instruction, such as those that offer highly salient information about task completion. Such skills include, for instance, emptying wastebaskets, putting down chairs stacked on tables, sweeping the stairs from top to bottom, or washing very obviously dirty ash trays. This is in contrast to activities such as dusting the railings, vacuuming the floor, sweeping the top of the pool table, or wiping off the chair seats; here, the objects acted upon look very much the same both before and after the task. In this example, the ecological model was used to select a non-school environment and to determine the skills necessary to function in that environment; the developmental model provided information that was used to refine the selection process by analyzing skills in terms of cognitively relevant dimensions. Then, as the student masters those skills, slightly more complex skills would be introduced so that progression would be vertical as well as horizontal.

The use of developmental information can also enhance the process of generating adaptations to normal skill sequences for students with autism. Using an ecological approach, teachers might make a decision to teach a 12-year-old student to ride the city bus based on parental preferences, age of the student, and the functional nature of the task. If the student is developmentally delayed, he or she might have difficulty with the task because of delays in temporal sequencing (i.e., remembering the next step in the sequence); classification (i.e., right bus vs. wrong bus); and judgment (i.e., when to get on and off the bus). With developmental information as a basis for predicting the problems he or she might encounter, the skill sequence can be adapted to compensate.[4] The student could learn to visually match a card printed with the

[4]Of course, an application of ecological theory would require that such predictions were validated during observations in the actual environments in which instruction was to occur. In addition, other types of information (e.g., the student's learning style, parental preferences, etc.) would also be considered in generating the adaptation.

bus route name to the route sign on the front of the bus to determine which bus to board (classification problem). The student could show the driver a laminated card containing his or her bus pass mounted next to a written statement of the destination (e.g., "Please tell me when I get to Park and Mills Streets"); this combines two steps into one (temporal sequencing) and eliminates the judgment problem. Likewise, if it were determined that the previously discussed janitorial job required the student to vacuum despite his or her means-ends deficits, the task could be adapted to his or her needs. For example, powdered rug deodorant could be sprinkled on the rug to highlight the distinction between the areas that have or have not been vacuumed. Although the ecological model would encourage use of adaptations such as these, the development of an effective adaptation is usually a trial-and-error process that can take many weeks. Use of developmental information may help to predict the areas in which adaptations will be necessary and to facilitate a good "match" between the adaptations and the student's level of understanding.

The utilization of both the developmental and the ecological approachs to maximize the advantages and to minimize the disadvantages of each is not a new idea (e.g., Bricker, Dennison, & Bricker, 1976; Reichle et al., 1980). It should be clear from this brief discussion that the presumed antithetic relationship between these two models need not exist in practice. This may be a case of "divorce before marriage," and creative strategies that result in a renewed relationship are in order.

A METHODOLOGICAL "MARRIAGE"

The construction of a technology that incorporates the positive aspects of both of the commonly used methodological models is made easier by a curriculum content merger such as the one discussed above. In fact, it is probably true that a synthesis of information in both areas is necessary to facilitate optimum learning in students with autism. Relevant, appropriate content taught ineffectively, or narrowly conceived content taught innovatively are both inappropriate.

The Behavioral-Interactionist "Marriage"

Because behavioral technology already offers an intact, empirically verified set of strategies for addressing the learning needs of severely handicapped students (e.g., Donnellan-Walsh et al., 1976; Martin & Pear, 1978); for training professionals and parents (e.g., Mash, Hamerlynck, & Handy, 1976); and for ensuring data-based accountability (e.g., Hawkins, Axelrod, & Hall, 1976), this model is suggested as the starting point of the methodological "marriage." Behavioral interventions that incorporate most, if not all, of the principles used in the interaction-based model can then be designed. For example, contingent positive reinforcement and nonaversive correction strategies (LaVigna & Donnellan, in press; Mesaros, 1982) can be used to provide students with the feedback they require, at the same time creating a positive classroom atmosphere. Programs designed to incorporate both behavioral and interaction-based strategies would also emphasize systematic instruction that encourages interaction and spontaneity. This could be accomplished through the use of behavioral strategies such as shaping, a technique whereby closer and closer approximations of a desired behavior are achieved by the use of positive reinforcement. The advantage of behavioral shaping is that it begins with a behavior the student already displays (an interactionist principle) and gradually molds it to a more sophisticated form in a variety of contexts. Thus,

shaping is more likely to preserve the functional relationships the student has already learned between self-generated behavior and its effects on the environment (Peck & Schuler, 1983). Child-initiated sequences could be emphasized in other ways as well, including at least the following strategies (from Duchan, 1986):

1. Determining what events the student knows and prefers and providing the accoutrements necessary for the student to initiate and carry out those events;
2. Responding contingently to the student's intent, content, and form, with priority given to the intent;
3. Minimizing correction procedures and instead accepting appropriate and valid answers, not just "right" answers;
4. Following the student's lead in interactions whenever possible;
5. Using well-rehearsed and initially understandable routines to introduce new concepts and to mark openings and closings of events; and
6. Allowing the student to have input regarding negotiation of the lesson format whenever possible (e.g., allowing the student to choose activities, when turns begin and end, etc.).

Flexible teaching techniques such as incidental training (Carr, 1985; Hart & Risley, 1980) could also be used to incorporate instruction into naturally occurring situations and contexts. In addition, integrative strategies such as the use of distributed training sequences (Mulligan, Guess, Holvoet, & Brown, 1980); real materials (Welch & Pear, 1980); multiple trainers (Marburg, Houston, & Holmes, 1976); and peer tutors (Egel, Richman, & Koegel, 1981; Lancioni, 1982; Robertson, DeReus, & Drabman, 1976) would ensure that opportunities for generalization are provided throughout the school day. A careful analysis of the contextual variables that seem to be relevant to an individual student would be incorporated into lesson planning so that generalization becomes part of learning (Duchan, 1986).

The key word for the methodological marriage is "flexibility." Behavioral strategies initially developed in laboratory settings have been indiscriminately applied in classrooms with students with autism for years. Recently, Donnellan, Mesaros, and Anderson (1984-1985) have extensively documented the need for more flexible, creative applications of behavioral principles. To this end, interaction-based guidelines offer valuable direction and balance, and the resultant "marriage" could be an exciting solution to present methodological difficulties. As Baer (1981a) noted, "I submit that if you know a good deal about operant conditioning, . . . then you are likely to know that its translation into procedure is vastly unexplored so far, and that however explored it is or ever is, it will always be only a set of procedures to be applied to a sequence of behaviors indicated as a curriculum" (p. 96). The development of both that ideal curriculum and that ideal set of procedures requires a synthesis of models from widely diverse viewpoints.

SUMMARY

This chapter has attempted to highlight some of the basic theoretical tenets and problems in the application of four models commonly used to plan "what" and "how" to teach students with autism. It can be argued that the models are not always applied in the spirit of the original theories, and that to criticize the models on the basis of applied distortions is unfair; perhaps this is true. It is also true, however, that students with autism in classrooms across the country suffer because of the distortions—not because of the original theories. In this light, the distortions are the appropriate targets for criticism.

Some solutions to the problems in application have been offered in the form of brief descriptions of two integrative strategies. The examples of these strategies are meant to be illustrative rather than comprehensive; for instance, no specific examples of how the mergers might affect the teaching of language or play skills were included, though the "new" models certainly have much to offer in these areas. There is much work to be done in translating these ideas into concrete teaching protocols; this is a separate task, however. More importantly, empirical studies are needed to identify the relative strengths and weaknesses of the models suggested here, as well as to compare their efficacy to more traditional curricular models.

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