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ABSTRACT

To help refine a model of educational productivity, this paper reviews eight theories that present holistic models of in-school learning. The holistic models, all published between 1963 and 1978, involve either individual learners or single learning tasks. The authors discuss each model in turn and then compare them. They note that the theories all include the concepts of immediate or "presage" conditions of learning, instructional processes, and educational outcomes, but that they differ over the variables to incorporate in each concept. Comparison of the eight theories with the model of educational productivity indicates that the latter covers the relevant variables for "presage" conditions and instructional processes and may be extended to predict any of the outcome variables. (Author/RW)

Psychological Models of Educational Performance: A Theoretical Synthesis of Constructs

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Running head: Psychological Models

Abstract

This paper reviews eight theories or models presenting holistic conceptions of student learning in classroom settings (Bennett, 1978; Bloom, 1976; Bruner, 1966; Carroll, 1963; Cooley and Leinhardt, 1975; Gagne, 1974; Glaser, 1976; and Harnischfeger and Wiley, 1976.) To be included, a model or theory was required to describe variables important to the performance of individual learners or single instructional tasks. Most models also derived implications for the organization of curriculum and/or group instruction. Following discussions of the eight models, major constructs posited by different theorists are cross-tabulated, and related to factors of the model of educational productivity (Walberg, 1980).

Psychological Models of Educational Performance: A Theoretical Synthesis of Constructs

A vast research literature documents the relations between student learning outcomes and other variables (Bloom, 1976; Dunkin and Biddle, 1974; Rosenshine, 1976). Good, Biddle and Brophy (1975) report that more than 10,000 studies have been conducted on the topic of teacher effectiveness, alone. In addition to this vast body of primary-research studies, scores of models and theories have been proposed that have relevance for education. However, as Snow (1973) has remarked, "Even a superficial scanning of the literature shows amazing diversity both in the use of the terms 'theory' and 'model', and in the nature of the formulations so identified." (p. 106).

This paper briefly reviews eight theories or models presenting holistic conceptions of student learning in classroom settings. These models cannot be classified strictly as theories of learning, theories of teaching or even as theories of instruction, although some have been termed "models of school learning" (Harnischfeger and Wiley, 1976). All of these eight models set forth the immediate conditions of individual learning, and most derive from these immediate conditions prescriptions for classroom practice or curriculum organization or both. Bloom (1976), for example, describes instructional practices (e.g., formative testing) and a curricular organization (hierarchically or sequentially organized learning units) which tend to assure appropriate cognitive entry behaviors as students begin to study successive topics.

The purpose of this review is to further refine the construct "quality of instruction" in Walberg's (1980) psychological model of educational productivity, and to explicate the relationship of this productivity factor to other productivity factors such as "motivation" and "quantity of instruction". None of the eight models reviewed is as comprehensive as the model of educational productivity (Walberg, 1980), but they can be used to derive subconstructs of "quality of instruction" and related constructs and they can generate hypotheses as to the interrelationships among some of the factors.

The first five models reviewed derive from a common tradition. Carroll (1963) first proposed a model of school learning in which major constructs were defined in terms of time, e.g., time spent learning or time needed to learn. Following Carroll's model, four additional models deriving in part from his conceptualization are reviewed. These include the work of Cooley and Leinhardt (1975); Bloom (1976), Harnischfeger and Wiley (1976), and Bennett (1978).

The last three models have their origins in psychological learning theory. Bruner (1966) draws upon psychological learning theory to determine the necessary conditions for learning to occur, and sets forth a prescriptive theory of instruction designed to assure that these conditions are met. His theory is organized around four concepts: predisposition to learn, structure of the curriculum, sequence in which material is presented, and nature and pacing of rewards and punishments. Gagne (1974) identifies five types of learning outcomes, and from psychology identifies internal and external conditions for the attainment of each type of learning. He then derives features of optimum instruction for each type of learning outcome. Glaser (1976) also derives

internal and external learning conditions from psychological theory, and presents a teaching model beginning with a description of competencies to be imparted and initial learner characteristics, proceeding through the implementation of conditions to induce change, and ending with the assessment of outcomes to determine whether the desired change has occurred.

Several recent models of teaching were not included in this review because they did not describe the immediate conditions of student learning. These include Dahloff's (1971) model for ability grouping, which describes learning conditions for groups rather than individuals. Also excluded from this review are the ecological models advanced by Kounin (1970) and Doyle (1977). Upon examination they proved to be more a model for classroom management than for instruction, and no set of individual-level learning conditions could be identified.

Psychological Models of Educational Performance

Below are brief reviews of the eight models. Each is discussed in terms of its essential components, its scope, and the range of outcomes addressed.

The Carroll Model

One of the earliest and most influential models for school learning was proposed by John Carroll (1963). In the model most of the constructs are described in terms of time. The assumption underlying the model is that students will master instructional objectives to the extent that they are allowed and are willing to invest the time needed to learn the content.

There are five main constructs in Carroll's model. The first three relate to entering behaviors of students. The first construct, aptitude, is defined as the amount of learning time necessary for a student to master an

objective under optimal learning conditions, which implies that a student with high aptitude will take less time to master content than a student with low aptitude. Perserverance, Carroll's second construct, refers to the amount of time a student is willing to invest in mastering the objective.. High perserverance is characterized by behaviors such as working beyond the time required, working even though environmental conditions are uncomfortable, or continuing to work on content after receiving feedback of failure. The third construct, ability to comprehend instruction, is related to general or verbal intelligence. It can be contrasted with aptitude, the first construct, which referred to how quickly an individual can master particular content. Carroll draws the implication that students with a high ability to comprehend instructions will be less affected by inadequate instruction than students with poor ability to comprehend.

In Carroll's model, the three constructs, aptitude, perserverance, and ability to comprehend instruction, describe behaviors students bring to the instructional setting. The remaining two constructs, opportunity to learn and quality of instruction, refer to instructional processes. Opportunity to learn is the amount of time a teacher allots for learning particular content. Teachers who are poor judges of how much time to allocate tend to present too much content and frustrate their students. The second construct, quality of instruction, is operationalized as the organization of instruction for ease of acquisition by students. Variables that affect quality of instruction include the precision of the teacher's instructions and how well the instructional task matches the student's entering characteristics. If the quality of instruction is poor, students will depend on their own resources.

In summary, the first three components can be measured by amounts of time, whereas, the latter two require analyses of instruction. The time components and the comprehensive approach inherent in the Carroll model strongly influenced subsequent theorizing.

Cooley-Leinhardt

Cooley and Leinhardt (1975) developed a classroom-process model that focusses on the relationship between school practices and school performance. The criterion variable being predicted includes both academic achievement and attitudes toward school, peers, and teachers. School performance is a function of the following constructs: initial abilities, opportunity, motivators, structure, and instructional events. The last four of these are classroom process constructs.

Opportunity is defined as the amount of time students could work on specific content. Motivators, either internal or external, are student behaviors and attitudes that promote learning activities. Examples of motivators include teacher praise for on-task behavior, choice of several desirable leisure-time activities for completed work, or instructional materials that incorporate motivational content that appeals to the student. The structure construct is focussed on curricular variables including the way the curriculum is organized and sequenced, the specificity of objectives, and the matching of students and curriculum. The instructional events construct is concerned with instructional interactions of an interpersonal nature: their content, frequency, quality, and length. The four process constructs briefly described above should explain variation in school performance not accounted for by student's initial abilities and attitudes.

Cooley and Leinhardt's description of initial abilities or performance includes general ability, prior achievement, and attitudes toward school, peers and teachers.

The Bloom Model

Bloom's (1976) model of school learning was also heavily influenced by Carroll's (1963) formulation. The model describes two types of prerequisites to learning, the learner's cognitive entry behaviors and affective entry characteristics. Quality of instruction is reflected in the use of cues, reinforcements, and feedback and correctives, but is also indicated by participation, or the degree of overt and covert involvement of students in the learning task. The results of instruction include not only achievement and affective outcomes, but also improved rate of learning, possibly via improved participation when good quality of instruction is consistently maintained.

Cognitive entry behaviors are conceived primarily as specific prerequisites to accomplishing individual learning tasks. As such, they correspond to Carroll's aptitudes. However, Bloom also describes "generalized cognitive entry behaviors" such as reading comprehension and verbal intelligence, which correspond to Carroll's "ability to comprehend instruction." It should be noted that the cognitive entry behaviors for a task depend not only upon learning objectives, but, upon the form of the learning task, as well. Thus, instruction may be adjusted, to some extent, to match the characteristics of different groups of learners without changing the instructional objectives.

Affective entry characteristics also include relatively task-specific attributes such as attitude toward the subject matter and more general attributes like attitude toward school and self-concept as a learner. They

correspond to Carroll's "perserverance" and to motivational components in other theories reviewed.

Four characteristics of good quality of instruction are defined in Bloom's model. Cues refer to the clarity of presentation and explanation of learning activities, and they resemble Carroll's construct of quality of instruction. Reinforcements refer to the praise and blame, encouragement and other rewards and punishments used to sustain learning. Feedback and correctives come into play primarily as sequences of tasks, or learning units, are taught. Since the outcomes of one learning unit contribute to the cognitive entry behaviors and affective entry characteristics of later units, it is important to assure mastery of each unit before proceeding. Formative mastery testing at the end of each unit (feedback) followed by supplementary instruction as required (correctives) can help to assure continued success for as many learners as possible. Participation, for Bloom, is usually defined in terms of time on task, or the percent of elapsed time during which the learner is overtly or covertly engaged. It is similar to Carroll's active learning time.

Of the three types of learning outcomes in the Bloom model, achievement requires little explanation. Affective outcomes refer not so much to the attainment of specific affective objectives as to a gradual, cumulative improvement in affective entry characteristics as the learner confronts successive tasks. Successful learning experiences, according to Bloom, should lead to improved attitudes toward schooling, an improved self concept, and more active involvement in future learning. The last of these, via improved participation, will lead to the third outcome, improved learning rate.

The Harnischfeger-Wiley Model

Harnischfeger and Wiley (1976) have offered another model based in part on Carroll's (1963) formulation, but also influenced by Bloom (1974). The model encompasses background characteristics, teaching-learning processes, and outcomes, but only the components of the teaching-learning process are elaborated extensively. Central to the model is the explicit recognition that all pupil outcomes are directly mediated through pupil pursuits. Thus teacher behaviors can influence learning only as they affect those pursuits.

Background characteristics in the Harnischfeger-Wiley model are subsumed under three interrelated components: teacher background, pupil background, and curriculum plus institutional factors. The teaching-learning process includes the two broad components, teacher activities and pupil pursuits. Teacher activities are influenced by all three background components, and, together with pupil background, serve to determine pupil pursuits. The latter in turn, again together with pupil background, determine pupil achievement.

In analyzing teacher activities and pupil pursuits, Harnischfeger and Wiley segment the total time pupils spend on a given subject-matter into seven learning-setting categories: 1) whole-class instruction, 2) supervised small-group instruction, 3) supervised individual instruction, 4) unsupervised group instruction, 5) unsupervised individual instruction (seatwork), 6) transitions, and 7) out-of-school pursuits (e.g., homework). Within those categories of allocated time during which instruction occurs, active learning time is distinguished from time the pupil is not productively engaged. Active learning time is determined by the pupil's task involvement and intrinsic motivation, as well as by the teacher's motivating skills and surveillance.

A clear distinction is drawn in the Harnischfeger-Wiley model between pupil time and teacher time. For example if the teacher spends twenty minutes with each of three reading groups while the other two groups are engaged in seatwork, the teacher has spent an hour in supervised small group instruction, but each student has spent only twenty minutes in that setting and forty minutes in unsupervised individual instruction. This model differs from other models reviewed in its exhaustive accounting for all the time in the school day and in its consideration of both the time spent by each individual learner and time spent by the teacher.

The Bennett Model

Bennett's (1978) model of teaching-learning processes was directly influenced by Harnischfeger and Wiley (1976) as well as Carroll's original formulation. He attempts to explain factors affecting success in school learning at the primary level by using concepts that generate practical research questions. The major variables in the model are quantity of schooling, time allocated to curriculum activity, total active learning time, total content comprehended, achievement on curriculum task, and feedback. Rather than stressing the effects of teacher behavior, Bennett follows Harnischfeger and Wiley in defining student activities as mediating all other aspects of the learning situation. Learning time, which varies for different pupils, is a critical determinant of achievement, according to Bennett, who cites evidence from numerous studies showing that pupil attendance, time spent on specific curriculum areas, and active learning time vary at the primary level. For Bennett, quantity of schooling is the total number of days and hours the school is open during the school year. This time is further reduced for individual

students due to absenteeism. Time allocated to curriculum activities is operationalized broadly and includes time used for classroom management, transition time between activities, and time spent on subject matter. Total active learning time, as in the Bloom and Carroll models, is operationalized as the time the student is either covertly or overtly engaged in learning. Subsumed under the component labelled total content comprehended, there are several mediational variables including aptitude, prior achievement, clarity of teacher instructions, and task difficulty and pacing. As a result of these mediational factors, only that amount of time when the student is actually comprehending the task is directly related to achievement. Like Bloom, Bennett has added the feedback component to his model which is not directly considered in the Harnischfeger and Wiley or Carroll models.

The Gagne Model

Gagne (1977) described eight types of learning, their products, and the conditions necessary to produce them. The eight types of learning are organized hierarchically, from simple associations to complex, higher-order processes. The five major categories of learning outcomes are 1) verbal information, 2) intellectual skills, 3) cognitive strategies, 4) attitudes and 5) motor skills. These five categories represent what is learned. Each of these categories of outcomes requires different types of conditions for learning and retention to occur.

A designer of instruction provides external support to enhance the likelihood of the desired type of outcome ocurring, by bringing about the necessary external conditions. Examples of such learning conditions for the various categories of learning outcomes include: activating attention and presenting a meaningful context (for verbal information), stimulating retrieval of pre-

viously learned components (for intellectual skills), providing opportunities to solve novel problems (for cognitive strategies), insuring identification on giving feedback (for attitudes), and arranging practice (for motor skills).

Regardless of the type of outcome, Gagne posits eight internal phases through which all learning proceeds, and describes the planning of instructional events to support these eight internal learning processes. These events incorporate the external conditions corresponding to the intended learning outcome (Gagne, 1977, p. 311). The eight phases, which are derived from an information-processing model, include such processes as memory-storage, retrieval and transfer. The instructional events that support the entire sequence of processes include: 1) activating motivation, 2) informing learner of the objective, 3) directing attention, 4) stimulating recall, 5) providing learning guidance, 6) enhancing retention, 7) promoting transfer of learning and 8) eliciting performance and providing feedback (Gagne, 1977, p. 285).

Gagne provides numerous examples to show how learning outcomes can be formulated, necessary external conditions of learning can be identified, and instructional events can be designed in implementing actual curricula. His model focusses more narrowly than others reviewed upon specific intended outcomes for individual learners. Thus, little attention is given to overall time allocations, or to the larger social context of instruction.

The Glaser Model

Robert Glaser (1976) developed a straight-forward model of teaching with four basic components: 1) analysis of the competence and skill to be achieved, 2) description of the initial state with which learning begins, 3) conditions that have to be implemented to produce change from the learner's initial state

to the state of competence and 4) assessment procedures to determine the short and long term outcomes of the conditions implemented. Each of these components is briefly described below.

Glaser's model begins with an analysis of competent performance, which entails identifying the demands which will be placed on cognitive processes, as well as knowledge and skills acquired from prior instruction.

The second component of the model is the description of the initial state of the learner. This requires careful assessment of students' talents, strengths, and weaknesses, including task learnings already acquired, prerequisite learnings, cognitive style, task specific aptitudes, and general mediating abilities, (Glaser, 1970). The purpose of this assessment is to determine the proper type and level of instruction for each student. Glaser (1976) stated that hierarchies of increasing competence in school subjects can be used by teachers to determine the proper entry level of students, once initial student characteristics are assessed.

The third component of the model is the identification of learning conditions that produce competence. In general, fostering competence requires the development of procedures, materials, and techniques. These must be designed into the environment in which learning occurs. Glaser (1976) presents some examples. One type of information which might foster competence is available in knowledge structures, which organize complex content and make it more easily available to the learners. Of course, the information contained in the knowledge structures would have to be interpreted into instructional procedures by a competent teacher. Another type of instructional procedure which fosters competence is teaching students generalized learning-to-learn

abilities. These are general heuristic or algorithmic strategies that help students learn on their own and not be as dependent on a teachers ability to instruct. Finally, Glaser (1976) suggests that contingencies of reinforcement be used to foster competence. All three of these are examples of approaches on which more research is needed.

The fourth and final component of Glaser's model is assessment of the effects of instruction. Glaser is concerned with both short and long-term effects. His interest goes beyond norm-referenced measurement toward measurement of competent performance, generalized patterns of behavior and ability for further learning (Glaser, 1976). The assessment obtains information regarding an individual's progress in relation to his developing competence. In summary, Glasers' model indicates that there are many aspects of teaching which are not based on the personality of the instructor, but rather on the intelligent use of information from assessments and instructional procedures.

The Bruner Model

Bruner (1966) set forth a normative theory of instruction organized around four requirements: implanting a predisposition toward learning, structuring the body of knowledge to be taught, sequencing the presentation of materials to be learned, and specifying the nature and spacing of rewards and punishments. Bruner derives recommendations for meeting these criteria from psychological theory. While he illustrates these recommendations for the area of mathematical problem-solving, he indicates that they have broad application.

Predisposition corresponds broadly to motivation for learning. Appropriate motivational devices depend upon the cultural context in which instruction occurs. One special type of motivation that Bruner considers at length is the

predisposition to explore alternatives. The instructor must be concerned with the activation, maintenance, and direction of this predisposition by maintaining an optimal level of uncertainty, communicating instructional goals, and indicating the relevance of alternatives already explored.

Optimum structure will differ according to learner characteristics, previous instruction and the nature of the subject matter. The structure should simplify information and facilitate generation of new propositions and manipulation of new knowledge. Bruner discusses structure in terms of mode of representation (enactive, iconic or symbolic), economy (how many pieces of information must be held in memory), and power (generativeness of new hypotheses and combinations).

Optimum sequence, like optimum structure, depends on a variety of factors. Typically, presentation of material should proceed from enactive to iconic to symbolic representations, but this is not always possible, necessary or desirable. Sequence is judged in terms of the final learning which results. Some criteria of optimum sequence include rapid learning, retention, transferability, modes of representation which will be required, economy, and power.

In connection with rewards and punishments, Bruner discusses such aspects of reinforcement as the use of intrinsic and extrinsic rewards and the provision of immediate and deferred gratification. Since instruction, for Bruner, is a provisional state with the object of making the learner self-sufficient, he advocates a shift from extrinsic to intrinsic motivators and from immediate to deferred gratifications. Under the rubric of rewards and punishments, Bruner also discusses feedback. He states that it is important to provide

feedback just at the point when learners must compare their performance to a criterion. Earlier or later feedback will not be as useful.

Although Bruner's instructional theory is presented in terms of a single learner, he states that because of individual differences among learners, curricula must provide a variety of possibilities for structure and sequence in order to provide appropriate options for all students. Many models derived from psychological learning theory are limited to the performance of individual learners on single tasks. Bruner, however, provides a theory which is broad enough to encompass group instruction and the organization of entire curricula.

Comparison of Models of School Performance

There are important commonalities among the various models reviewed. All specify certain conditions prerequisite to optimally effective instruction, all discuss some characteristics of the teaching-learning process, and all indicate those more or less quantifiable outcomes of schooling with which they are concerned. Within each of these areas, however, distinctions among the theories are apparent. Each model is unique in the particular constellation of variables through which it seeks to capture the complexities of school performance. To facilitate comparison among the models reviewed, major constructs from each of them are displayed in Table 1. This table, organized according to the inputs or presage conditions, instructional process variables, and learning outcomes considered by each theorist, serves to highlight both commonalities and distinctions.

Presage conditions considered by the various theorists most often include cognitive and attitudinal attributes of individual learners. Several theorists

segment the cogntive attributes into what might be termed intelligence (or ability to comprehend instruction, general mediating abilities, etc) and prior learning (or prior achievement). An additional conceptual distinction is drawn in Glaser's model between general ability and what he terms task-specific aptitudes (as opposed to learnings). In addition to conditions internal to individual learners, several theorists discuss presage conditions in the environment, including teacher background, curriculum and institutional factors, and cultural context. Cooley and Leinhardt also consider peer influences, but conceive the relevant variable in terms of attitudes within individual learners.

It is in their conceptions of instructional process variables that the eight theorists differ most from one another. In addition, the first five models (Carroll's model and the four models influenced by his conceptualization) can be seen to differ from the models of Gagne, Glaser, and Bruner. The first five models reviewed, with minor exceptions, include constructs representing amount of instruction (time, opportunity to learn, etc.) and quality of instruction. Quality is indicated by global variables like clarity of instruction, structure, appropriateness to the needs of the learner, or curriculum organization, and also by specific instructional features, including motivators, cues, and pacing or feedback. The last three theorists, Gagne, Glaser, and Bruner, organize process variables somewhat differently. Time or opportunity is not as salient for these theorists, and in general they focus more narrowly upon single instructional tasks, and describe instruction via a series of steps, stages, or phases. Gagne and Bruner both recognize explicitly the role of the teacher in motivating learning, struc-

turing and sequencing the learning activity, and providing feedback (subsumed by Bruner under rewards and punishments). Glaser's process variables are more global. Rather than discussing specific features of good instruction, he provides general criteria which good instruction should meet. Like Gagne and Bruner, however, he recognizes explicitly the importance of feedback, or assessment of effects of instruction. It should be noted, however, that none of the theorists reviewed consider teacher personality to be central to their models.

The outcomes discussed by Carroll and the four theorists with similar models tend to focus on acquisition of content, or academic achievement, although two of the five also attend explicitly to schooling-related affective outcomes. Bloom may be concerned additionally with a more generalized cognitive outcome when he discusses improved learning rate, but his primary concern, nonetheless, appears to be mastery of the immediate content presented. In contrast to these five theorists, Gagne, Glaser, and Bruner are all concerned with cogntive outcomes beyond acquisition of the content presented. They discuss such constructs as intellectual skills, cognitive strategies, generalized patterns of behavior, ability for further learning and processes of knowledge acquisition. For Glaser and Bruner, such "higher-order" outcomes clearly predominate. Gagne, more than the other theorists, devotes extensive attention not only to these "higher-order" outcomes, but to informational (i.e. achievement) and attitudinal outcomes, as well.

Implications of School Performance Models for a Model of Educational Productivity

The summarization in Table 1 compared and contrasted the theorists with one another. However, in order to refine the constructs and subconstructs

of the model of educational productivity (Walberg, 1980) it was also necessary to correlate constructs from the various models directly with the educational productivity factors. The alignment of constructs according to these factors is displayed in Table 2.

In examining Table 2 it is clear that Walberg's (1980) ability and motivation factors largely subsume the presage conditions isolated by the different theorists. Within the ability factor, three general kinds of constructs emerge: general ability, task-specific aptitudes, and prior learnings. Following Glaser, the last of these could be further divided into prerequisite learnings and task learnings already acquired. Motivation appears to include two types of constructs: willingness to engage in learning and interest in subject matter. Additional presage conditions identified by isolated theorists might be subsumed under home environment or peer influence, as shown in Table 2. Harnischfeger and Wiley's curriculum and institutional factors are the only presage conditions that do not appear to correspond to any of the Walberg productivity factors.

The quality and quantity of instruction factors in Walberg's model parallel the quality and opportunity constructs discussed by the first five theorists in connection with instructional process. There do not appear to be any aspects of instructional process isolated by any of the eight theorists that are not included in one of these two factors. Inspection of Table 2 suggests, however, that quality of instruction includes a substantially broader range of distinct subconstructs than any of the other productivity factors.

Outcome constructs do not appear in Table 2 because Walberg's model has been formulated as a production function, with inputs to the instructional pro-

cess represented by productivity factors and outcomes represented as dependent variables, or outputs, predicted by the function. There appears to be no obstacle to considering all types of outcomes within the context of the Walberg model, although to date, primarily cognitive outcomes have been examined.

In summary, the educational productivity model provides a conceptual framework within which virtually all constructs isolated by earlier theorists can be considered. The only possible exception would be the curriculum and institutional factors operating beyond the level of individual classrooms, as addressed by Harnischfeger and Wiley (1976). The educational productivity model goes beyond earlier models in its treatment of the home environment, peer influences, and mass media, as determinants of learning outcomes.

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Table 1

Conditions, Processes and Outcomes of Instruction Addressed in Models

Theorists	Presage Conditions	Instructional Processes	Outcome
Carroll (1963)	Aptitude; Perserverence; Ability to comprehend instruction	Opportunity to learn; Quality of instruction (clarity of instruction, matching task to student characteristics.)	Proficiency in content
Cooley & Leinhardt (1975)	General ability; Prior achievement, Attitudes toward school, peers & teachers	Opportunity; Motivators; Structure; Instructional events (organization of curriculum; Specificity of objectives; Matching students & curriculum)	Academic achievement; Attitudes toward schools, peers & teachers
Bloom (1976)	Cognitive entry behavior (Prior achievement; Reading comprehension; Verbal intelligence) and Affective Characteristics (Attitude toward subject matter; Self-concept as a learner; Attitude toward school)	Use of cues; Reinforcements; Feedback and correctives (indicated by participation, overt or covert, in learning task)	Achievement, Affective behaviors, Improved rate of learning
Harnischfeger and Wiley (1976)	Teacher background, Pupil background, Curriculum & institutional factors.	Teacher activities and pupil pursuits	Achievement
Bennett (1978)	Aptitude & prior achievement (part of Total content comprehended)	Clarity of instruction; Task difficulty and pacing (subsumed under total content comprehended); Time variable representing opportunity to learn	Achievement on curriculum task

Table 1 (cont.)

Theorists	Presage Conditions	Instructional Processes	Outcome
Gagne (1977)	Internal conditions of learning	Activating motivation; Informing learner of objective; Directing attention; Stimulating recall; Providing learning guidance; Enhancing retention; Promoting transfer of learning; Eliciting performance and providing feedback	Verbal information; Intellectual skills; Cognitive strategies; Attitudes; Motor skills
Glaser (1976)	Task learnings already acquired; Prerequisite learnings; Cognitive style; Task specific aptitudes; General mediating abilities	Development of procedures, materials and techniques that foster competence (e.g. Knowledge structures; Learning to learn; Contingencies of reinforcement) Assessment of effects of instruction	Competent academic performance; Generalized patterns of behaviors; and Ability for further learning
Bruner (1966)	Individual skills and predispositions; Cultural context	Implanting predisposition toward learning; Structuring knowledge (mode of representation; Economy and Power); Sequence of materials Specifying rewards and punishments	Process of knowledge getting