PERSONALIZED INSTRUCTION

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Introduction

Albert Einstein (Schlipp, 1951) once lamented that "it is, in fact, nothing short of a miracle that the modern methods of instruction have not yet entirely strangled the holy curiosity of inquiry; for this delicate plant, aside from stimulation, stands mostly in the need of freedom; without this it goes to wreck and ruin without fail. It is a very grave mistake to think that the enjoyment of seeing and searching can be promoted by means of coercion and a sense of duty." Einstein particularly scorned the tests that were a part of "modern education." He said, "One had to cram all this stuff into one's mind for the examinations, whether one liked it or not. This coercion had such a deterring effect on me that, after I passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year (Hoffman, 1972)." Einstein, of course, was talking about graduate education, but the principles he suggests – freedom of inquiry, thought and reflection rather than pressure and memorization – apply equally well to undergraduate and other segments of schooling.

Certainly many great scholars and creative thinkers were excellent students. We must be careful not to indict traditional education on the basis of personal testimonials (Simonton, 1999). But the reality is that much of contemporary education – what Einstein referred to as "modern" and we would characterize as conventional – is heavy on standardization and regimentation, teacher domination, and testing and more testing. In this Fastback we propose to describe a clear alternative to this coercive state of educational affairs, an approach to schooling that is both less restricting and at the same time more productive of self-directed discipline on the part of students and decidedly more professionalized for teachers. We call this approach "personalized education" and its pedagogical component "personalized instruction."

What Is Personalized Instruction?

Personalization of instruction and learning is the effort on the part of a school to take into account individual student characteristics and needs, and interactive and thoughtful instructional practices, in organizing the learning environment. Personalized instruction is predicated on caring, but it is more than that. It is a mindset committed to student initiative in the pursuit of meaning. Personalized instruction is also a set of strategies. The strategies are many and will be discussed in a later section of this Fastback. In general, teachers committed to personalizing instruction help their students develop personal learning plans, assist in diagnosing student cognitive strengths and weaknesses and other style characteristics, help adapt the learning environment and instruction to learner needs and interests, and mentor authentic and reflective learning experiences for their students. Before we treat personalized instruction in detail, however, it is important to explore the broader compass of systemic school renewal and to discuss some of the forerunners of personalization.

 Renewal Rather Than Reform. Kenneth Sirotnik and John Goodlad caution educators to think in terms of school "renewal" rather than "reform." Sirotnik (1999) tells us that reform is usually preoccupied with accountability rather than evaluation. Much of contemporary high-stakes reform, for example, is aimed at rewarding or punishing schools and educators. Renewal, on the other hand, urges a new accountability more akin to "responsibility." Goodlad (1999, pp. 574, 575) points out that, "The language of reform carries with it the traditional connotations of things gone wrong that need to be corrected, as with delinquent boys or girls incarcerated in reform schools. This language is not uplifting. It says little or nothing about the nature of education, the self, or the human community.... School renewal is a much different game....The language and the ethos of renewal have to do with the people in and around schools improving their practice and

developing the collaborative mechanisms necessary to better their schools." Renewal is all about learner growth in knowledge and self-awareness leading to wisdom, personal happiness, and collective responsibility. Only a minority of schools achieve these kinds of reflective and exploratory environments. Most schools are average and are satisfied with maintaining or perhaps fine-tuning traditional school organizational patterns and pedagogy. The 21st century demands more.

Systems Thinking. An optimal learning environment must be both fluid and well organized if it is to make best use of the limited time available each day for formal schooling. Systems thinking can provide the template for this design. A system is a group of parts that operate together and influence the operation of the whole. Deming (1993) calls a system "a network of independent components that work together to accomplish the aim of the system."

The essential characteristics of a system are properties of the whole and not of the individual parts. Human bodies are systems. A building is a system. An automobile is a system. "The essential property of an automobile is that it can take us from one place to another. No single part of an automobile--a wheel, an axle, a carburetor--can do that. Once we take a system apart, it loses that fundamental characteristic. If we were to dissemble a car, even if we kept every single piece, we would no longer have a car. Why? *Because the automobile is not the sum of its parts; it is the product of their interactions"* (Wardman, 1994, p. 2, emphasis in original).

Schools can be like that. If you analyze the elements of many schools, you will find that they do not fit together very well. They are merely loose collections of parts that do not really mesh. They were never designed to work together. They just *happened* that way because of long tradition and periodic addition or subtraction of components. Schools, like all systems, operate according to the first principle of systems thinking: *structure influences behavior*. A system functions in a certain way because of its structure. In a very real sense, *a system causes its own behavior*. Conventional schools function in traditional ways because their systemic components make it hard to do otherwise. Their systemic structure is the pattern of their *interactions*--the

relationships--not among people, but among *the key components of the school organization* (Keefe & Jenkins, 1997). Urban schools, for example, are thought to be the victims of poor teachers and unruly students, but the reality is that the structures and processes of these schools do not support learning for their particular students. Often the schools are dysfunctional, not the students or the teachers.

The aims of public schooling at the turn of the twentieth century were to socialize and provide basic skills training for scores of immigrants, using factory-line technology to produce standard products. Teachers were the workers; students, the products. "Based on faith in rationalistic management, in the power of rules to direct human behavior, and in the ability of administrators to discover and implement common procedures to produce desired outcomes, twentieth century education policy has assumed that continually improving the design specifications for schoolwork--required courses, textbooks, testing instruments, and management systems--will lead to student learning. Knowledgeable teachers were not part of the equation because the bureaucratic model assumed that important decisions would be made by others in the hierarchy and handed down in the form of rules and curriculum packages" (Darling-Hammond, 1997, pp. 16-17).

School as Knowledge-Work Organization. One could argue that such schools were functional 100 years ago, but the circumstances for which they were designed no longer exist today. Yet, many contemporary schools still operate according to that earlier design. And because structure influences behavior, many of these schools are highly dysfunctional in the contemporary environment. The old factory metaphor saw teaching as the transmission of organized knowledge, the curriculum as a delivery system, and the core functions of teaching as lecturing, questioning, giving assignments and homework, correcting papers and giving tests, awarding grades, and so forth. Peel and McCary (1997) argue that a more functional metaphor for the contemporary school is a "knowledge-work organization." Under this conceptualization, teaching involves presenting students with opportunities to do high-quality work. This kind of teaching provides information but also ways to apply it to relevant tasks. Learning is an *active* process, beginning with basic skills, but

emphasizing effective problem solving, productive teamwork, and the skills of lifelong learning.

Conceptualizing the school as a knowledge-work organization invokes a *systems design for schooling*, one better suited to the needs of twenty-first-century students. Because the rationale is very different, a school as a knowledge-work system encourages teachers to act very differently:

1. To design work for students that will capture their interest and motivate them;

2. To assist students in decision making with suitable tasks, solutions and timetables for the work to be performed;

3. To serve as facilitator and motivator of students, using their knowledge to suggest ways to complete the learning tasks; and

4. To act as student performance coaches, providing feedback so that students can judge and improve their own performance (Peel and McCary, 1997).

The Historical Roots of Personalized Instruction

John Dewey's laboratory school at the University of Chicago (1896) is arguably the first attempt to institutionalize some form of personalized instruction. Dewey believed in the centrality of the individual student and organized the laboratory school accordingly. The project method was the school's mainstay.

In 1921, Helen Parkhurst, a teacher in the town of Dalton, Massachusetts, trained in the Montessori approach, introduced what become known as the Dalton Plan. The Plan replaced traditional classrooms with laboratories in each subject area. Students worked in the laboratories on monthly contracts under the direction of one or more teachers. In this arrangement, teachers were viewed as facilitators and coaches rather than presenters of information.

The first formal teacher-advisor program was established in 1924 at the New Trier High School in Winnetka, Illinois. The Advisor-Personnel Plan, as it was called, was "designed to provide educational, vocational, social, moral, and ethical guidance and counsel to all students at the school" (Clerk, 1928, p. 1). Self-instructional materials were developed by teachers to enable students to progress at their own rate. Students were judged in terms of their own growth and development rather than in terms of group norms (Washburne & Marland, 1963, p. 22).

In 1930, The Progressive Education Association established the Commission on the Relation of School to College. The purpose of the Commission was to study the relationship of high school curriculum and education on success in college admissions and achievement. Despite some differences, the thirty schools were guided by two general principles: (1) the life of the school and the methods of teaching should focus on the way adolescents learn and grow, and (2) democratic values should be taught experientially. This Eight-Year Study (1933-1941) revealed that the experimental school graduates did better in college on several key dimensions than did their cohorts from more traditional schools. In fact, the more an Eight-Year Study high school differed from a traditional school, the more dramatic were the differences. Unfortunately, the results of the Study were overshadowed by the beginning of World War II, and later by a "return to basics" movement (Aiken, 1942).

In 1968, the National Association of Secondary School Principals (NASSP) in cooperation with the Danforth Foundation launched the Model Schools Project (MSP). Led by the NASSP's director of research, J. Lloyd Trump, the Project focused on the implementation of a comprehensive model in the thirty-five participating secondary schools. The MSP approach combined continuous progress scheduling, teacher advisement, large group, small group, and independent study, differentiated staffing, team teaching, self-paced materials, and a different strategy for student evaluation. This all-at-once approach to innovation attempted to personalize education for each student using the procedures of diagnosis, prescription, implementation, and evaluation (DPIE).

The Model Schools Project ended in 1974. The Learning Environments Consortium (LEC) was formed at that time as a MSP follow-up in the western United States and Canada. Some changes were made in the original MSP model, but the underlying tenets were retained. The Consortium adopted Keefe's (1989) enhanced DPIE model: *Diagnosis* incorporated a student's learning history, developmental level, and learning style. *Prescription* emphasized advisement, goal setting, program planning and placement. *Implementation* embraced flexible scheduling and pacing and authentic instructional strategies. *Evaluation* looked at school program, teacher skills and student achievement. This expanded DPIE Model, combined with the six components of personalized instruction outlined in this document, currently guide LEC's work with several elementary and secondary schools (Keefe and Jenkins, 2000).

The most direct *antecedents of personalization* have been known under different names: nongraded education, individualized instruction, continuous progress education, individually guided or prescribed education, adaptive instruction, and style-based instruction. Each of these concepts is concerned with personalized education but in a limited way. Personalization is broader in scope, more systematic in organization, and more authentic in its goals and strategies. The following are among the most prominent antecedents of personalization.

- *Nongraded education is primarily a cross-age grouping practice* that facilitates school progress based on student skill levels and achievement rather than year of birth.

- *Continuous progress (CP) education is a scheduling strategy,* a way of organizing the school program to facilitate self-pacing and individual student learning plans.

- *Individualized instruction is a teaching methodology* that generally focuses on behavioral objectives, content sequences, multiple learning activities and materials, arrangements for individual learning differences, and differential use of staff. Some systematic individualized programs such as *Individually*

Guided Education/Secondary (Klausmeier et al., 1980) and *Adaptive Instruction* (Wang & Lindvall, 1984) approach personalization.

- *Style-Based Instruction* is a contemporary diagnostic-prescriptive instructional system that grew out of research on cognitive controls, personality types, and the relationship of individual differences to instructional method. Its strengths are its diagnostic component, the potential for flexible learning arrangements, and the use of performance-based assessment.

Some other contemporary approaches to instructional improvement such as differentiated instruction embrace many of the elements of personalization.

The Basic Elements of Personalized Instruction

If we consider the implications of historic efforts to renew schooling, and take into account the most flexible of recent efforts to individualize learning, the basic elements of a personalized approach to instruction begin to emerge. Darling-Hammond (1997) argues that we must put students first; that all children have a right to learn. She cites four factors that are important for powerful teaching and learning: 1) structures for caring and structures for serious learning; 2) shared exhibitions of student work; 3) structures that support teacher collaboration focused on student learning; and 4) structures for shared decision making and dialogue about teaching and learning. (Darling-Hammond, 1996).
These structures are not a model to be imposed on schools but rather they are a broad blueprint for ongoing improvement in school organization and good practice. With this important caveat in mind, we propose *six basic elements of personalized instruction* that should be cultivated if a school wishes to develop powerful teaching and learning for student success (see Figure 1). We think of these six basic elements as constituting the <u>culture</u> and <u>context</u> of personalized instruction. The cultural components--teacher role, student learning characteristics, and collegial relationships-- establish the foundation of personalization and ensure that the school prizes a caring and collaborative environment, student diversity, and individual development. The contextual factors--interaction,

flexible scheduling, and authentic assessment--promote and support student engagement, thoughtful growth, and proficient performance.

Figure 1. Basic Elements of Personalized Instruction

1. A dual teacher role of coach and adviser.

2. The diagnosis of relevant student learning characteristics, including: Developmental level; Cognitive /learning style; Prior knowledge/ skills.

3. A culture of collegiality in the school, characterized by: A constructivist environment; Collaborative learning arrangements.

4. An interactive learning environment characterized by: Small school or small group (class) size; Thoughtful conversation; Active learning activities; Authentic student achievement.

5. Flexible scheduling and pacing, but with adequate structure.

6. Authentic assessment.

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1. **Dual Teacher Role.** The indispensable catalyst in the personalized instructional environment is the teacher, the instructional specialist who is closest to the learning situation and best understands the needs and interests of students as well as the policies of the school and the district. Personalized instruction demands that the teacher assume the dual roles of subject-matter coach, consultant and facilitator, and teacher-adviser to a select group of students

Teacher-Coach. Teacher-coaches offer the same kind of instruction, demonstration, practice, and feedback to their students that athletic coaches and student activity advisers have modeled in the most successful of their programs. The needs of today's students are quite different from those of their counterparts two or three generations ago. The world has experienced several social revolutions and a knowledge explosion that makes it almost impossible to "cover" more than a small part of what students need to know for a

reasonably successful life. Cognitive and problem solving skills, what some call metacognitive skills, are more important today than any single piece of knowledge. The teacher-coach in the school environment must be a facilitator of learning, a learning guide who helps students find appropriate resources and engage in suitable learning activities. Members of the Learning Environments Consortium International (Georgiades, Keefe, Lowery et al., 1979) describe such a teacher as "not so much educational broadcaster as academic troubleshooter. He devotes fewer hours to lecturing in front of a class and more to working with students individually and in small groups."

Teacher-Adviser. Advisement is the other facet of the new teacher job description--a helping role. As teacher-adviser, the teacher provides advice, counsel, and guidance to 15 to 20 students on academic and school-adjustment issues. In advisement, teachers, counselors, and other adults work as a team to promote student adjustment and success in school. Professional counselors serve as advisers to a group of teacher-advisers and help them to learn their role and its functions. Over the years, advisement programs have been called by many names. The programs have varied from place to place, but generally call for a teacher to assume school guidance functions that are narrowly limited to academic program planning, career/college information, school adjustment issues and personal-social guidance. In middle schools, many adviser programs take on the character of group guidance, but these applications are usually limited in scope and often in success. The most successful advisement programs emphasize personal contact between students and advisers and continuing support of the student in his or her academic program and personal adjustment to school. The NASSP Breaking Ranks report (1996) specifically mentions the role of the adviser (Personal Adult Advocate) in helping students personalize the education experience.

2. **Diagnosis of Student Learning Characteristics.** Instruction must begin with knowledge of the learner if the goal is to build a learning environment suited to the aptitudes, needs, and interests of each student. The foundation of any personalized instruction approach is some form of diagnosis--determining what the learning-related characteristics of

individual learners are. Diagnosis is concerned with discovering such student learning traits as developmental level, learning style, and learning history.

Developmental characteristics are those specific stages in individual maturation when certain capacities for learned behavior appear (e.g., visual perception, language pronunciation, and cognitive thinking skills). Examining these characteristics of students can tell us *when* they are developmentally ready to learn something -- their individual readiness for learning. Certain capabilities appear only after the appropriate stage in individual development occurs. If not exercised then, the capacities are not likely to develop later (e.g., skills in athletics, peer relations, language learning, etc.). Darling-Hammond (1997) calls for "developmentally attentive schools." Students, particularly in the lower grades, need hands-on learning with concrete and active learning activities. Nor should developmental attentiveness end with primary schooling. Braddock and McPartland (1993) argue that many problems that teenagers have in school are a result of the notable mismatch between their developmental needs and the learning environments of many junior and senior high schools. When teenagers need close relationships, they get large, impersonal schools. When they need to experience some autonomy, they get rigid rules, curricular tracking, and large doses of memorization.

Student Learning Style. Student learning style is the second broad diagnostic element. Learning style encompasses information-processing habits, attitudinal tendencies and biologically based responses that are typical of the ways a given student learns and prefers to learn. There are three broad categories of learning style characteristics:

- Cognitive styles are preferred ways of perception, organization and retention. Diagnosing perceptual modality preferences, for example, is basic to understanding a student's visual, auditory, or psychomotor learning style.
- Affective styles embrace the motivational dimensions of the learning personality. Each learner has a personal motivational approach.
- Physiological styles are traits deriving from a person's gender, health and nutrition, and reaction to the physical surroundings such as preferences for levels of light, sound, and temperature in the learning environment.

Learning style is a gestalt that tells us *how* a student learns and prefers to learn. The Learning Style Profile (Keefe, 1988), for example, assesses independent scales representing four factors: perceptual responses, cognitive styles, study preferences, and instructional preferences. The Learning Style Profile and other comprehensive style instruments help teachers identify student style strengths and weaknesses and organize instruction more efficiently and effectively.

Student Learning History. Student prior experience is the third broad area of diagnosis. "Student learning history" is a term coined by Benjamin Bloom and his colleagues in mastery learning research to describe the aggregate of personal learning that each student brings to a particular course, class, or school program. A learner's "history" tells us *what* a student knows and can do at a given point in his or her learning career--the knowledge, skills and attitudes that the student possesses before beginning a new learning experience. Observation, surveys, inventories, teacher and counselor reports, and curriculum-referenced tests (rather than standardized tests) best assess these knowledge or skill levels.

3. **Culture of Collegiality.** A third essential ingredient of personalized instruction is a school culture of collaboration where teachers and students work together in a cooperative social environment to develop meaningful learning activities for all students. A collegial culture is characterized by a constructivist environment and collaborative learning arrangements

Constuctivist Environment. Constructivism holds that individual learners construct knowledge by giving meaning to their current experiences in the light of their prior knowledge. Opportunity and time for reflective dialogue are critical elements of such a learning environment. Constructivist teachers build a knowledge-work environment on existing student learning styles and skills, and encourage students to expand upon and to look for meaning in their current experiences. Constructivist teachers encourage student reflection, problem solving and initiative.

Collaborative Learning Arrangements. An important goal of schooling is to create learning communities in which students can confront important ideas and apply these ideas to real-world experiences that they can understand and use. Collaborative learning arrangements provide an opportunity for students and teachers to work together to verbalize their ideas, to sharpen their thinking, to capitalize on differences. Considerable evidence exists, for example, that students learn better in cooperative groups than when alone (Slavin, 1991, 1995). Cooperative small groups encourage more useful collaboration and better socialization than traditional classrooms, yet produce solid achievement gains. Glasser (1986) believes that small learning teams offer a good chance of motivating almost all students. Stronger students, Glasser argues, find it need-fulfilling to help weaker students, and weaker students find it need-fulfilling to contribute to the team effort. Students learn to depend not only on the teacher but on the teammates and their own creativity.

4. **Interactive Learning Environments.** Interactive learning environments are designed to foster collaboration and reflective conversation. Recent studies have found that high schools restructured to provide interactive learning arrangements produce higher student achievement gains which are also more equitably distributed among socioeconomic subgroups (Lee & Smith, 1995). These studies found that collective responsibility for student learning, an academic emphasis, and high morale are important features of a successful school learning community. Successful practices include school-within-school units, interdisciplinary teaching teams and common teacher planning time. Interactive learning environments are characterized by small school or group size, thoughtful classrooms, active learning experiences, and authentic student achievement.

School or Group Size. Darling-Hammond (1997) reports than more than 30 years of studies on school organization "have consistently found that small schools (with enrollments of roughly 300 to 600) promote higher student achievement, higher attendance, lower dropout rates, greater participation in school activities, more positive feelings toward self and school, more positive behavior, less violence and vandalism and

greater post-school success. These outcomes are also found in settings where students have close sustained relationships with a smaller than average number of teachers throughout their school careers." Smaller class size is invariably the better choice when the group is 20 or less, but in the range from 20 to 40 students, class size makes little or no difference (ERS, 1978; Glass & Smith, 1978). The real issue is what kind of grouping (large, medium, small) best serves the students in a particular content area or activity? A choir or a band usually benefits from a larger size. Skill learning, discussion, and reflective conversation demand small groups. Research and reading are often best done alone. The size of the group should be a function of its purpose.

Thoughtful Environments. Smaller schools and small group size can better support thoughtful conversation, learning by doing, apprenticeship experiences, and authentic student achievement. Schrag (1992) argues for more "thoughtfulness" in classrooms. Researchers at the University of Wisconsin National Center on Effective Secondary Schools developed a set of rating scales for "thoughtful lessons" in social studies based on Schrag's conception of good thinking. Instruction is thoughtful when it focuses on a few important topics with coherence and continuity, provides plenty of time for investigation and interactive dialogue, raises challenging issues that require students to produce new knowledge, and stresses the quality of supporting explanations and reasons over the need for "right" answers. Barry Beyer (1992, pp. 94-95) argues that at least four elements must be present for a thoughtful learning environment:

1) Classroom layout that invites thinking--not in traditional rows, but students facing each other in groups, working in learning centers or in meaningful clusters.

2) Classroom interactions that involve information processing, rather than information receiving or repeating.

3) The use of precise, thoughtful language rather than vague terminology or generalizations.

4) The organization of classroom study and courses around thoughtful questions--real inquiry built on questions of real interest to students themselves.

<u>Active Learning Experiences.</u> Susan Kovalik and Karen Olsen (1998) contend that prior learning experiences are critical to the success of active forms of learning. The human brain continuously searches for <u>patterns</u> in incoming information as it attempts to find meaning in the data. The *more active the learning experience, the more likely that the input will be rich in meaning.* Kovalik and Olsen (1998) suggest two rules of thumb to enhance learning: 1) Provide real-life richness and context in all learning situations. The less the input, the harder the learner will struggle to find meaning. 2) Design curriculum and instruction to utilize all of a learner's prior experience and to maximize the amount of sensory input during learning. Human learning is rarely linear or neat or orderly or typically logical, but rather multilinear, multisensory, and seemingly illogical until the learner perceives clear patterns in the information that are personally meaningful.

<u>Authentic Student Achievement.</u> Instruction is authentic when it focuses on the kind of mastery found in successful adults. Authentic <u>human</u> achievement is concerned with what is significant, worthwhile and meaningful in the lives of successful adults from all walks of life. Authentic <u>academic</u> achievement is concerned with accomplishments that are significant, worthwhile, and meaningful for learners preparing for adulthood (Keefe & Jenkins, 1997). The Center on Organization and Restructuring of Schools (CORS) at the University of Wisconsin-Madison devoted five years of research to the formulation and study of criteria and standards for authentic academic achievement, authentic instruction, authentic assessment tasks, and authentic performance (Newmann, Secada, & Wehlage, 1995). The center characterized authentic academic achievement in terms of three criteria: construction (not reproduction) of knowledge, disciplined inquiry (mastery of a field), and value beyond school. Newmann, Secada, and Wehlage (1995) argue that, in traditional programs, the "absence of meaning breeds low engagement in schoolwork and inhibits transfer of school learning to issues and problems faced outside the school."

5. **Flexible Scheduling and Pacing.** The schedule of a school makes the educational philosophy of the school evident and visible. If the philosophy is traditional, the schedule will likely be quite structured. If the philosophy is constructivist or learner-centered, the schedule will almost necessarily be personalized or at least very flexible. Two ingredients

seem necessary to the development of more personalized student schedules. First, both students and teachers must have input into the use of time. Teachers can accomplish this by making requests through team leaders or department chairs, and teacher-advisers can meet with individual students to guide their scheduling decisions. Second, achievement must be judged on a performance basis. Placing the emphasis on performance rather than time increases the opportunities for student choices in defining curriculum and instruction. Continuous progress and block schedules seem to best facilitate performance-based assessment. The longer time periods in block schedules, for example, permit students to take part in community service and other extended experiences (Sizer, 1992). Teachers have time under both scheduling options to plan with colleagues, to serve as advisers to students, to work on curriculum, instruction, and assessment, and to contact parents. CP schedules can provide similar opportunities.

6. **Authentic Assessment.** Assessment is the process of gathering information about students. Assessment is *authentic* when it focuses on real performance and mastery of a field of knowledge. The improvement of student learning, not sorting or grading, is the primary purpose of assessment. Assessment and testing are often used interchangeably, but tests are only one form of assessment. Assessment goes beyond testing and includes such activities as demonstrations, oral and written presentations, performances, contests, projects, and problem solving activities. Athletic competitions are assessments of how well a team or an individual has prepared for a contest. A dramatic performance is an assessment of the cast's talents and readiness. (The audience response is one measure of the quality of the performance.) In all cases, the method of assessment should fit the purpose of instruction. If students are expected to learn to write well, the competency can hardly be measured by multiple-choice questions on grammar. Having students actually write or develop responses to open-ended questions is a more suitable device. Even better would be to give them time to write and then revise their writing.

The various types of authentic assessment can be grouped under naturalistic assessment, performance assessment, and portfolio assessment (Case, 1992).

Naturalistic assessment is the kind of appraisal that takes place during normal learning activities. The teacher as "participant-observer" systematically collects information about students and records it for later analysis and summation.

Performance assessment is an omnibus term that "refers to evaluating what students can do by examining them in the process of demonstrating some skill, by performing a specified task, or (creating) a product that students construct and develop in response to a set of directions" (Ryan & Miyasaka, 1995). The object of this kind of assessment is a student-developed performance or product, such as an essay, script or story, a science experiment, or a piece of art or technology. The merit badge system in scouting is a form of performance assessment. Some educators call the more formal versions of these performance assessments, "exhibitions," in which students present their academic efforts for review and discussion, or in order to certify their competencies.

Portfolio assessment involves students as compilers, with teachers as supervisors. Portfolio assessment has its origins in the practices of artists, architects, and designers who assemble key examples of their work for employment interviews or for display. Students collect and select pieces of their work over a period of time as evidence of completing their learning objectives. Typically, they also write a rationale to explain why they selected these pieces as their best work. (Case, 1992; Ryan & Miyasaka, 1995).

Strategies and Tactics for Personalizing Instruction

Instructional strategies tend to be more personalized when they are more interactive and promote thoughtful reflection in learners. The more intense the interaction between the sources of instruction and the student, the more likely the student will learn. Students in personalized learning environments engage thoughtful material at their particular levels of development and then advance to more challenging levels.

Keefe and Jenkins (2000) rated approaches to personalized instruction on two continua: (a) the interactive nature of the instruction (whether from teacher, mentor, materials, or other aspects of the learning environment) and its responsiveness to different learner characteristics, and (2) how thoughtfully learners apply knowledge and skills in different

circumstances. Each of these criteria is considered in terms of a four-point Lickert scale with 1 the lowest and 4 the highest. Figure 2 combines these two characteristics in a two-dimensional matrix and locates each of 20 strategies in a cell depicting where it lies on both continua. Ten of these strategies are discussed here, along with their levels of interaction and thoughtfulness. A complete description of all 20 strategies can be found in *Personalized Instruction: Changing Classroom Practice* (Keefe and Jenkins, 2000).

(Put Figure 2 about here)

Obviously, any attempt to classify strategies into one category or another is tenuous. Placement clearly involves subjective judgment and cannot account for the level of implementation. We postulate four levels primarily to help school practitioners gain a sense of the status quo and the scope of developing strategies. Level one strategies are an initial step toward personalized instruction; level four are considered current state of the art.

Individualized Instruction (I-1, T-1): This strategy was initially associated with Skinnerian programmed instruction. Students are able to work through pre-packaged materials at their own rate of speed. Individualized instruction has been updated with computer-assisted instruction and other self-instructional techniques. It is usually linear in its approach, with all students expected to learn the same material in the same sequence. Branching techniques are used in some programs to teach or re-teach information based on students' incorrect responses.

Direct Instruction (I-1; T-2): Direct instruction is a systematic method of teaching that emphasizes proceeding in small steps, checking for student understanding, and achieving active participation of all students. According to Bruer (1999) explicit instruction is most effective when used with students who exhibit serious deficiencies and who appear less able to make wise instructional choices and to function independently.

Direct instruction involves six teaching functions:

1. Beginning the lesson with review and check of previous work.
2. Presenting new material.
3. Guided practice.

4. Providing feedback and correctives.

5. Independent practice.

6. Weekly and monthly review (Rosenshine, 1991).

Style-Based Instruction (I-2; T-2): In style-based instruction, the learning environment is adjusted to accommodate student differences. Usually a formal assessment is conducted with a generic learning style instrument. Student profiles are generated that give information about perceptual modalities, cognitive skills, instructional and study preferences. Teachers confirm the results of the assessment(s) by observing students at work, interviewing individual students, and/or administering more intensive diagnostic instruments. The results are used to plan and implement appropriate teaching strategies geared to individual differences (Keefe, 1991).

Style-based approaches use learning guides, contract activity packages (CAPS) and other types of individualized learning units created by teachers to offer students choices for achieving common objectives. These materials replace whole-class instruction. Contract activity packages, for example, contain a variety of resources to accommodate student style differences (Dunn and Dunn, 1992). Comprehensive style-based instruction models also attempt to accommodate student cognitive skill weaknesses by offering skills training either in special resource rooms or in regular classroom instruction.

Technology-Assisted Learning (I-2; T-3): The skillful use of technology can enable students to advance through a curriculum at their own rate or to pursue a topic in depth. The Internet permits students to investigate topics of special interest or to research specific content. E-mail allows student researchers to interact with experts in a field, other researchers, or university professors. Students can also collaborate with other students or mentors in different parts of the country or the world. For example, students in one Florida high school collaborated with students in a Japanese high school to construct a space station prototype. And videodiscs such as "The Adventures of Jasper Woodbury," developed at Vanderbilt University's Learning Technology Center are available to teach problem finding and problem solving in middle school mathematics.

Contract Learning (I3; T3): Contract learning is an instructional approach in which a teacher and a student design a learning activity that the student implements independently, with teacher supervision. Contracts offer students the opportunity to accelerate their learning, to study a topic in depth, or to pursue a special interest. Teachers monitor students' progress on their contracts, but students also exercise a good deal of responsibility for their own learning. The degree of responsibility or structure depends on the individual student and is usually determined in consultation with the teacher. A contract typically includes statements about the content to be included, the learning objectives, a list of activities to be conducted, resources to be consulted, a timeline with due dates, and a description of how the work will be assessed and evaluated. The student, teacher, and sometimes the parent(s), sign the contract.

Authentic Pedagogy (I-3; T-4): Researchers at the University of Wisconsin have developed three principles for determining the degree to which instruction can be labeled "authentic." First, instruction is authentic if it focuses on what people do in the *real* world, that is, construct, produce or apply knowledge to resolve a *real* or simulated problem. Second, authentic instruction is grounded in one or several domains of knowledge rooted in high standards of intellectual quality. Third, authentic instruction has personal or utilitarian value beyond what students typically do in school. Authentic student work must influence an audience of peers or others, result in a product, or communicate ideas in a way that demonstrates deep understanding of a domain of knowledge (Newmann, Marks, and Gamoran, 1995).

Teachers who practice authentic pedagogy assess an individual student's knowledge and create a learning environment that emphasizes higher-order thinking and in-depth understanding. The teachers serve as coaches, mentors, and facilitators, stressing collaboration among students and higher expectations for intellectual accomplishment.

Guided Practice (I-4; T-4): Guided instruction is widely used in the arts and athletics. Usually the teacher or coach demonstrates a skill to be learned. The student then

attempts to do what has been demonstrated while the teacher or coach watches carefully. Mistakes are noted, and the process continues until the student attains mastery.

The transfer from athletics or the performing arts to teaching as coaching involves the student practicing a target behavior under the supervision of a teacher-coach. The teacher-coach asks appropriate questions during the process to gain insight into the student's level of skill or attainment. Often the student is asked to verbalize the steps of the process so that the teacher/mentor can assess competence and/or determine next steps. In some cases, students are encouraged to perform a skill or solve a problem as completely as they can so that the teacher-coach can determine the point at which intervention is appropriate. One commonly used support is *scaffolding*, a "process that enables a child or a novice to solve a problem, carry out a task, or achieve a goal which would be beyond their unassisted effort" (Wood, Bruner, and Ross, 1976, p. 91). Prompts and *scaffolds* are gradually removed as a student becomes more self-sufficient.

Cooperative Learning (I-4; T-4): Cooperative learning occurs in small groups where students work together to accomplish a common academic task. Each student is accountable for both the successful completion of the academic task and the working relationships within the group. The teacher sets the task, establishes the procedure, provides resources, encourages a healthy interdependency among all group members, and monitor's the group's progress.

Four elements appear necessary for a small group to work together effectively: positive interdependence among the learners, face-to-face interaction, individual accountability and interpersonal and small group skills. David and Roger Johnson at the University of Minnesota and Robert Slavin at Johns Hopkins University have developed the most frequently used cooperative group strategies. These include such techniques as Student Teams-Achievement Division (STAD), Group Investigation and Jigsaw. In the latter, students are assigned to six-member teams to work on subject matter divided into five sections. Each student studies his or her section thoroughly, meets with members of other

teams who are studying the same section, and returns to his or her home team to teach the other members of the team about the section.

Topic Study or Storyline (I-4, T-4): Topic study was developed in the late 1960s and early 1970s in Scotland in response to its Office of Education Report which stated that a child's growth and development depended on an awareness of home, school and neighborhood. This strategy begins with a story line, establishes a time and place, introduces the main characters, and identifies problems to solve. Using the general strategy of inquiry and discovery, students learn that ideas are negotiable if they supply evidence to support them. Heterogeneous groups of students are assigned tasks commensurate with their prior knowledge, skills, and experience. When topic study immigrated to the United States in the 1990s, its name was changed to *story line*.

One topic or storyline for the intermediate grades has students design the inside of a space vehicle that could be used to transport others to colonize a planet other than earth. Students brainstorm answers to the question, "What do people need to survive?" A list of items is generated, categorized and used to form work crews. Students then select the group in which they wish to work. The work crews search for information associated with their areas by browsing the Internet, consulting library resources, and talking with experts. Ultimately, a space vehicle is constructed in accordance with specifications developed by the various work groups. Students then plan and execute a simulated day in space (Creswell, 1997).

Differentiated Instruction: Differentiated instruction, not considered in our original twenty strategies, has been popularized recently by the work of Carol Tomlinson (1999, 2000) at the University of Virginia. Ironically, it is not a new approach, but one based on the venerable one-room schoolhouse. In that earlier era, the teacher was challenged to find ways to work effectively with students of different ages and differing needs. The contemporary approach draws heavily on best practices employed in special and gifted education, as well as research in learning styles, multiple intelligences, and authentic assessment.

Tomlinson (2000) warns that differentiation is not a recipe for teaching nor is it an instructional strategy. Rather, it is a way of thinking about teaching and learning based on beliefs of student readiness to learn, their styles of learning, and their life circumstances. In a differentiated classroom, the teacher typically offers two to four different learning options for students or may give students opportunities to make their own choices. In many ways, differentiated instruction resembles a grouping strategy called "directed study" used in the NASSP Model Schools Project (1969-1974) to introduce entering students to the concepts and skills of continuous progress learning. In this sense, differentiated instruction may well be a useful transitional strategy for schools as they move toward school-wide personalized instruction. We would rate it as intermediate to high in interactiveness and thoughtfulness.

In a "differentiated" high school pre-calculus class, for example, students select from among a group of activity folders to enhance their understandings and skills. While students work on the folder activities, the teacher works with individuals, assisting them with problems, monitoring their progress, and challenging them with questions. Although the teacher often uses whole-class instruction, most of the class is organized into small groups of three to four students. Students are assigned to the groups based upon their levels of readiness for the concept being studied. Students work together, helping each other to understand and correct their work while the teacher monitors.

School-wide Approaches to Personalized Instruction

Only a few schools currently use all the elements of personalized instruction in a comprehensive and systemic school design. Many others are working toward this implementation. We would like to cite two schools, one in Canada and one in the United States, that best exemplify current initiatives to personalize instruction. These two schools are personalizing instruction in different ways, but both are challenging students to accept responsibility for their own learning. The programs are summarized here in terms of the six elements of personalized instruction.

Thomas Haney Secondary Centre, Maple Ridge, British Columbia.

Dual teacher role as coach and adviser: Multi-age groups of 18 students meet with their teacher-advisers 10 times each week. Hour-long meetings on Mondays facilitate the establishment of individual student goals for the week and the arrangement of schedules accordingly. A second hour-long meeting on Thursday provides time for teacher-advisers to check on each advisee's academic progress. As students advance at their own rates through a continuous progress curriculum, teacher-advisers keep them on track and intervene when necessary. The teacher-adviser is the one adult in the school who has close personal knowledge of all facets of a student's academic life, and some facets of his or her personal life.

Teachers at Haney also serve as learning coaches and facilitators to students engaged in their subject specialties. Students create their own daily schedules in conjunction with their teacher-advisors and with recommendations from their subject-area coaches (called "markers"). One teacher in each of the subject areas is assigned as marker to meet with a student to give academic advice and feedback. Generally, students work on four courses at a time. Teacher-coaches monitor student course work, give help when needed, offer seminars on more advanced content or as follow-up, and assess student achievement.

Diagnosis of student characteristics: Each advisee is given a student plan book. Students develop a personalized educational plan with the help of their teacher-advisors, including daily and weekly plans. The amount of time students spend in the various subject areas is compared with their academic progress in each of them. Students take the Learning Style Profile (LSP) and the results help teachers and students choose activities from the learning guides and select appropriate learning environments.

A culture of collegiality: Teachers work in departmental teams. Each teacher has a workstation in a common planning area for the total faculty. The workstations are

equipped with a computer that links the teacher to databases detailing individual student progress and background information. Students often work in teams or in pairs as they complete activities from teacher-developed learning guides. It is not unusual to see students working together toward the solution of common problems or students tutoring other students. When asked about the differences between Thomas Haney and her previous school, one student remarked, "It is more difficult here. I must do the work and do it well before I receive credit. I can also get help from my fellow students. We aren't competing with each other."

An interactive, thoughtful learning environment: The curriculum at Haney is delivered through a series of learning guides based on a defined scope and sequence for each course. The learning guides are written by teachers and address major course objectives. Course content is rigorous and focused on the standards mandated by the British Columbia Ministry of Education. Varying activities are offered so that students can meet the objectives in accordance with their knowledge, skills, developmental needs and learning styles. Creative independent or group projects are also built into the learning guides. The learning guides are viewed as road maps that lead students to a wide variety of learning resources. Students are expected to accept much responsibility for their own learning with teacher-coaches available when needed.

Flexible scheduling and pacing: The school utilizes a continuous progress schedule, which allows students to progress through courses at their own rate. Students and their teacher-advisors make decisions about the location and amount of time a student may spend working on a particular course, unit or learning activity. Computer networking enables subject teachers to report student progress to the teacher-advisors. Subsequent placement and scheduling decisions are made in light of student progress. Teachers and teaching teams schedule group activities as needed. Some groups grow out of the learning guides and are scheduled on an ad hoc basis. If a student wishes to devote extended time to working on a project, he or she checks with the teacher-advisor and the subject teacher(s) to arrange the schedule.

Authentic assessment: Testing centers in each subject area enable students to take tests when they are individually ready. Student comprehension and understanding take precedence over simply accumulating grades for the report card. Teacher-"markers" review test results and meet with students one-on-one. Students can redo any unsatisfactory work until problem areas are corrected. Other forms of assessment include presentations to peers and faculty members, project exhibitions, musical recitals, and demonstrations.

Francis W. Parker Charter Essential School, Devens, Massachusetts

Dual teacher role as coach and adviser: All Parker teachers serve as advisers to 12 students. Students meet twice each day in advisory groups for 15 minutes and for one hour every Friday. The teacher-advisers are there to help students through both academic and personal problems, as well as to monitor their academic progress. Students are placed in new advisory groups each year. Teacher/student ratios are generous (1:8.5) enabling teachers to get to know their students very well and to coach them through challenging academics. Teachers lecture less and coach more at Parker. They see themselves as friends of the 350 students in the 7-12 school and operate on a first-name basis with them.

Diagnosis of student characteristics: Much is asked of Parker students academically as they advance through a six-year program of studies at their individual rates of performance. Students are expected to demonstrate mastery of school standards for Division I: (roughly seventh and eighth grades), Division II (roughly ninth and tenth grades), and Division III (roughly eleventh and twelfth grades). They demonstrate mastery of curricular standards in each Division through exhibitions in which they present and defend their academic portfolios. Students do not advance by grade levels, and the school typically does not classify students in that way. Promotion from one division to another in a specific domain is determined by the quality of the student's "Gateway Portfolio." Students who meet the standards for Division III and have completed the graduation requirements, which include a senior project, are eligible for graduation, regardless of age.

A culture of collegiality: Teachers at Parker participate in a true learning community. They collaborate with colleagues to create and evaluate the curriculum; they work with colleagues, parents, and students to define school standards and norms; they work with other professionals to provide special services to students who need them; they act with colleagues, parents, and students in making decisions about the school; they involve parents, students, and community members in assessing student progress; and they engage colleagues in collaborative observation, critique, and reflection. Each teacher's schedule provides two hours per day to engage in professional activities with colleagues.

Students serve on important school operations committees, a school-wide Community Congress, and a School Justice Committee. The Parker School Constitution, written and ratified by the students, frames student life. Service is a key ingredient in the school mission. Peer tutoring is widely practiced, as is the hosting of visitors to the school.

An interactive and thoughtful learning environment: Small classes allow the school to achieve its goal of thoughtful inquiry and mastery with close coaching from teacher mentors. All coursework revolves around a school-wide "Essential Question" that cuts across traditional subject matter lines. The "Essential Question" for the year is addressed in all three Divisions and generates sub-questions that invite active learning and content-area projects and other investigations.

For the initial school year (1995-96), the Parker "Essential Question" was "What is community?" which made sense in a developing organization. The "Essential Question" for the second year was "What is change?" which epitomized the Parker experience for students and faculty who were make a transition from more traditional school settings. Questions for recent years are as follows:

- What really matters? (2000-2001)
- Where's the truth? (2001-2002)
- What are the possibilities? (2002-2003)
- What's next? (2003-2004)

Division III students culminate their studies with a capstone Senior Project, a topic or activity which they explore independently with the guidance of a learning preceptor. The projects for the 2002 graduating class included: "What is the cognitive, emotional, and social development of kindergartners?" "How can I adopt the styles and techniques of Italian cinema to make my own short film?" and "What are the different aspects of emergency medicine?" (Francis W. Parker website, 2003).

Flexible scheduling and pacing: Parker classes are a heterogeneous mix of 15-30 students whose ages span several years and who work with one or two teachers toward mastery of the common standards. Students and faculty have sufficient time in their daily schedules to pursue work independently and collaboratively. Two-hour blocks of time enable students to move about the school locating resources needed for individual and group projects. One visitor to the school observed "The class was not quite a class in the ordinary sense in which the word is used. Two teachers served 25 students for a block of two hours' time. Students moved in and out of the room easily on their way to other, seemingly more appropriate centers in the school, to do their work. Some went to a computer center, others to the library, and some to unusual places like the hallway."

Authentic assessment: Assessment is a seamless continuum with curriculum and instruction. Students are assessed on content and skills using standards drawn from state and national frameworks. The school has rigorous performance standards in reading, writing, listening, oral presentation, research, artistic expression, scientific investigation, mathematical problem solving, systems thinking, technology, wellness, and Spanish. Year-end assessment reports for each student contain a brief summary of the school curriculum and a narrative description of his or her progress in each of the three integrated domains (1. Arts and Humanities, which includes Spanish; 2. Mathematics, Science and Technology; and 3. Wellness). Students who do not make adequate academic progress are given additional help. The Parker transcript shows these assessments and the dates on which the student advanced from one Division to another in each of the three domains. Since progress is individual and personal, a student can be in different divisions in the three domains.

The school does not use numbers, rank, or traditional A to F grades.   Narrative assessments are recorded at mid-year and year's end.   Teachers judge student work as "just beginning to meet curriculum standards (JB)," "approaches curricular standards (A)," or "meets curricular standards (M)." The Parker transcript form simply documents a student's progress through the academic program using the JB, A and M codes. Parker students score well at grades 8 and 10 on the required Massachusetts assessment (MCAS), as well as on the Stanford 9 achievement tests (Francis W. Parker Charter Essential School Annual Report, 1995-96).

Improving the Future of Education

Educators committed to the development of personalized education and personalized instruction in schools must become change agents. Instructional design or redesign is an exercise in change process. Traditionally, schools have been resistant to comprehensive redesign efforts because coherent processes for school improvement and suitable instruments for data collection and management have not been widely available. That is no longer true.

(Put Figure 3 about here)

A process for implementing design-based, strategic change is summarized in Figure 3 (Keefe & Howard, 1997). A design-based, systemic change process differs from the traditional process because a new design is developed for the school and after that point (Step F in the change process), change is design-driven rather than needs or problems-driven. This design process combines the most practical features of strategic thinking and systemic approaches to change management. The steps of the process are more interactive--less sequential--than the traditional process.

The Design Statement. A key component of the change process outlined in Figure 3 is the School Design Statement, a set of specifications for a community's desired school of the future. All components defined in such a statement are interdepedent and must be consistent with one another. The total design must be *comprehensive*; i.e., all components

necessary for the operation of the school must be specified. Such a Design Statement provides the direction and focus for a school's systemic change process.

It is not our purpose here to treat the complete School Improvement Process or the Design Statement in detail, but some comment on its relevance to personalized instruction is necessary. (For more information on the total design process, see *Redesigning Schools for the New Century: A Systems Approach* by J. W. Keefe and E. R. Howard, NASSP, 1997.) The Design Statement includes eleven components, one of which is called *Instructional Techniques*. The design process calls for schools to write short descriptive paragraphs defining those teaching techniques chosen by the school because research or best practice suggests they will be successful in accomplishing the school's desired student outcomes. The descriptors spell out the roles of teachers in the program and recommended teaching methods and strategies.

A school that is considering implementing personalized instruction should first look seriously at the process of school design/redesign. *Personalized instruction is a systems concept and requires a comprehensive and systematic implementation.* School staff members must ask themselves what structure and programs they want and need for their students to become responsible and successful citizens of this information-age society. School leaders must carefully evaluate their present practices, and in the light of their literature searches and assessment data, decide on a series of specifications for their desired school program—their program of the future. The instructional specifications they choose must be compatible with the school's mission and vision and with its other basic and systemic components.

The following is a sample personalized instructional specification developed by Thomas Haney Secondary School, Maple Ridge, British Columbia.

> *Personalized Learning*: The Thomas Haney Secondary School is committed
> to a "Personalized Learning" model (Keefe). Personalized learning can best be
> achieved if students are freed from a master schedule and, instead, are
> engaged in a directed-studies plan (see Keefe & Howard, 1997).

In *Redesigning Schools for the New Century*, Keefe and Howard (1997) characterize the School Improvement Process and the School Design Statement (Figure 3) as "a plan for

the plan" that a school itself must develop and continually update if it hopes to implement and institutionalize a new school design/redesign. Whether a school envisions a self-contained classroom approach to personalization like directed study or differentiated instruction, or a comprehensive, school-wide system utilizing such strategies as project learning, guided practice, cognitive apprenticeship and topic study, the need for a plan is compelling, even urgent. Any form of personalization is complex and demands careful planning. A School Design Statement is the first step, but one that must be reviewed on a regular basis and updated to ensure that its specifications have been enacted and, if successful, incorporated into the systemic structure of the school.

A New Accountability

Many educators, and most policy makers, have been more concerned in recent years with standards and standardization than with learning and its assessment; in rating schools rather than finding out what individual students know and are able to do. The more important issues of learning and assessment have taken a back seat, such issues as preinstructional diagnosis, concern for core or essential knowledge and skills, flexible approaches to instruction, the uses of assessment in instruction, etc. Peel and McCary (1997, p. 704) point out that "the unintended consequences of standardized testing have become more apparent (e.g., a narrowed curriculum, frozen instructional practices, and a very limited picture of significant outcomes of schooling)." Of course, traditional and standardized testing practices are used primarily for keeping score rather than for feedback. Personalized instruction requires the latter. Accountability is important, but it must be viewed as *responsibility*—schools accepting real liability for student learning and intervening to provide adequate resources and help and alternatives to traditional instruction and testing.

Reform and restructuring efforts have become commonplace over the past three decades in response to various kinds of national and regional reports. Yet much of what has evolved is fine-tuning, an attempt to modify or regulate the *existing* structure of schooling. John Dewey (1902) thought of the child as an active organism

in search of stimuli that will promote its growth. He stressed the experiential nature of learning as problem solving and the local nature of schooling, emphasizing active community participation in the process. He stated that "the manner in which the machinery of instruction bears upon the child really controls the whole system." A controversial study of American education commissioned by the U.S. Department of Energy and conducted by the Sandia National Laboratories (Carson et al., 1992) drew on existing national data bases to profile the current status of schooling. The report pointed out that many of the current recommendations for educational reform were in conflict. The Report urged that our educational priorities should emphasize improving the education of minority and inner-city students, adjusting to immigration and demographic changes, and enhancing the status of teachers. These recommendations suggest a more focused and personalized approach to schooling. They argue for more attention to inner city and rural schools, to learner differences, and to the developmental needs of teachers.

We know quite a bit today about what makes schools exemplary and what makes instruction more successful. And we know that exemplary schools support exemplary learning environments. They set out deliberately to design or redesign themselves with an eye to providing the most supportive learning environments for all their students. Jerome Bruner (1998) says that "culture is probably biology's last great evolutionary trick. It frees *homo sapiens* to construct a symbolic world flexible enough to meet local needs and to adapt to a myriad of ecological circumstances." The best schools redesign themselves with teachers acting as guides and resources in a process of shared exploration with students who are active in thinking about their own learning and in planning and implementing their own projects. Bruner argues that this kind of learning requires the active construction of knowledge through social interaction--a culture of reflection, collaboration, and personalization. It is our strong conviction that this kind of learning can be supported only when a school commits itself to the elements of personalized instruction – a dual teacher role, a diagnostic approach to learning, a collegial

school culture, an interactive school learning environment, a flexible school schedule, and a strategy for authentic student assessment.

Figure 2. Personalized Instructional Strategies

Thoughtfulness Level

Interaction

Level

	1	2	3	4
1	Individualized Instruction;	Accelerated Learning; Mastery Learning; Direct Instruction;	Independent Study; Montessori Approach;	
2	Experiential Learning;	Style-based Instruction;	Technology-assisted Learning;	
3		Cognitive Skill Development; Inquiry approaches;	Contract Learning; Peer Tutoring;	Authentic Pedagogy;
4			Dewey's Project Learning; Reciprocal Teaching;	Guided Practice; Cooperative Learning; Cognitive Apprenticeship; Topic study (Storyline).

FIGURE 3
NASSP School Improvement Process

A. Form Management/Design Team

B. Conduct Awareness/Commitment/ Development Activities

I. **Evaluation and Reporting**
- Annual Review
- External Audit (2d or 3d Year)
- Continuous Update

E. **Develop Basic Design Components**
- Mission & Vision Statements
- Culture & Climate Statements
- Student Goals & Outcomes

C. **Create Learning Organization**
- Building Shared Mastery
- Personal Mastery
- Mental Models
- Team Learning
- Systems Thinking

H. **Implement Action Plan—Options**
- Total Design/ Redesign (Systemic)
- Restructuring (Partial)

F. **Develop Systemic Design Components (Specification Writing)**
- First Draft
- Revisions

D. **Initiate Planning Process— Collect & Interpret Data**
- CASE-IMS Profile
- CASE-IMS Interventions and Predictions
- Literature Search

G. **Prepare Action Plan**
- Task Force Formation
- Priority Setting