

Analogical Anchoring: Part Two

Key Elements of Analogical Anchoring

Janis Bulgren
KU-CRL

"The teacher cannot presume that students can 'pick-up' on developing the process of the Analogical Anchoring Table."

Teaching routines in the Content Enhancement Series developed by the University of Kansas Center for

Research on Learning are designed to help teachers mediate learning while compensating for the fact that there is some material that students cannot learn independently. Teaching routines are built around a teaching device such as Analogical Anchoring Table. This device was created to help students understand new information by developing an analogy between a familiar concept and a new, unknown concept. The development of an Analogical Anchoring Table, or more simply, an Anchoring Table (See Table on page 3), was the focus of an article in the April, 1993, issue of *Strategram*, in which the concept "warm-blooded animals" was developed using a modern home with automatic heating and cooling mechanisms as an analogy.

The use of a teaching device derives much of its power to help students understand, organize or remember information when used in conjunction with a teaching routine. Explicit teaching routines involve selecting a teaching device, explaining to students how and why the teaching device will be used to enhance learning, and then regularly and consistently incorporating the teaching device and accompanying teaching routine into instruction. However, students must be prepared to benefit from the use of teaching devices and routines. The teacher can do this by sharing the importance the device such as the Anchoring Table, conveying expectations associated with the teaching routine (the Anchoring Routine) and then describing both the device and routine.

Preparing students to learn with the Anchoring Device and Routine

Share Goals. First, students must be made aware of intended goals involved in the use of an Anchoring Table and the accompanying Anchoring Routine. Time is precious for both teacher and students in today's classroom. Thus, when a teacher decides to take the time to develop an Anchoring Table, students should understand that the teacher places a great deal of importance on the selected topic. The teacher's goal will be to help students learn important and difficult information about which students may have missing or faulty prior knowledge. Teachers might initially introduce the Anchoring Table to students as follows:

"Today I will be using Analogical Anchoring for the first time. I plan to use it several times throughout the year. I want you to know that I will use an Anchoring Table when I find an important concept or topic which you need to understand well. Remember, if I use the word 'concept,' I am referring to a class, group or category of items that always have certain characteristics in common. If we work together to develop Anchoring Tables, we will be able to assure ourselves that everyone in the class understands an important concept or topic. If everyone understands a concept, we can discuss in class and work together in groups because we all have the same understanding. In addition, when you go on to other classes, or even when you discuss information outside of school, you will know that you understand this concept or topic well."

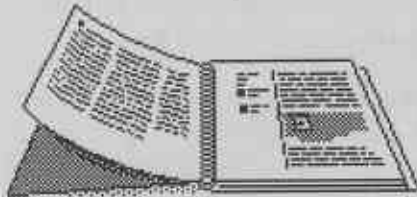
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Describe the Anchoring Table.

The teacher must share with students the form and meanings of graphics on the Analogical Anchoring Table. The teacher can not presume that students can "pick up" on the process of developing the Anchoring Table. Therefore, both the form of the Table and the process through which the Table will be developed to assist learning must be shared with the students. Teachers might say:

"I will show you an Anchoring Table, and then I will share with you how we will use it together. (Put a



blank Anchoring Table on an overhead projector or draw one on the blackboard.) Notice that there are two boxes near the top of the Anchoring Table. The box at the top right is labeled 'New Information' and marked by the number '1.' Here, I will put the name of the concept that I have selected. The box at the top left is labeled 'Familiar Information' and marked by the number '2.' This is for the name of the concept or topic that I have selected as an analogy for the new information. From this point on, I will ask you to help me complete the Anchoring Table. For example, we will identify together important characteristics of the familiar information; these will be placed in the column in the left center part of the page marked by the number '3.' Then, we will work together to pick out similar characteristics possessed by the new information and place these in the column in the right center of the page marked by the number '4.' In the center column of lines marked by the number '5,' we will note how these characteristic are similar, that is, we will explore why we can make the analogy we have just made. Finally,

in the box at the bottom of the page, marked with the number '6,' we will work together to summarize what we have just learned together by stating the relationship between the familiar concept and the new concept."

Discuss expectations. In essence, the teacher has been conveying to the class a philosophy that teacher and students are partners in the learning process. As partners in the learning process and members of a learning community, the teacher and each student has an understood role, is an active communicator, and shares common goals. This may be a new mindset for some; therefore, this philosophy must be shared with the students. Teachers might say:

"Sometimes when we have a great deal of information to cover, I present it to you, or you read it from the book. Many times, we each feel as if we are working alone and discussing very little. We will have a different way of working when I use a device such as the Anchoring Table. We will work together to construct an Anchoring Table, and we will all have things to contribute as the Anchoring Table develops. You can always be certain that whatever concept or topic I select to explore with you is a difficult concept in some way. Each of us may find different details that are challenging. Therefore, we will explore all suggestions and comments together and make corrections or additions without feeling pressure to know the 'right answer' immediately. I plan to learn more about the concept or topic with you as we discuss it together. Therefore, we are partners in this process."

Describe and Model Analogical Anchoring Routine. Notice that the teacher has done extensive individual planning in selecting critical content, analyzing the

content to determine where students may lack prior knowledge, choosing the new concept or topic to be enhanced, selecting the familiar concept or topic as the analogy, and developing the Anchoring Table with meaningful correspondences in characteristics. In addition, extensive interactions with students have taken place in the form of sharing with the students the goals, rationales, expectations processes and hoped-for outcomes.

Only now is the teacher is ready to share with the students the Anchoring Routine and to coach them about how to become partners in learning. Teaching routines involve cueing and reviewing the content and the process of learning in addition to the steps with which the Anchoring Table is presented. Teachers might say something like the following:

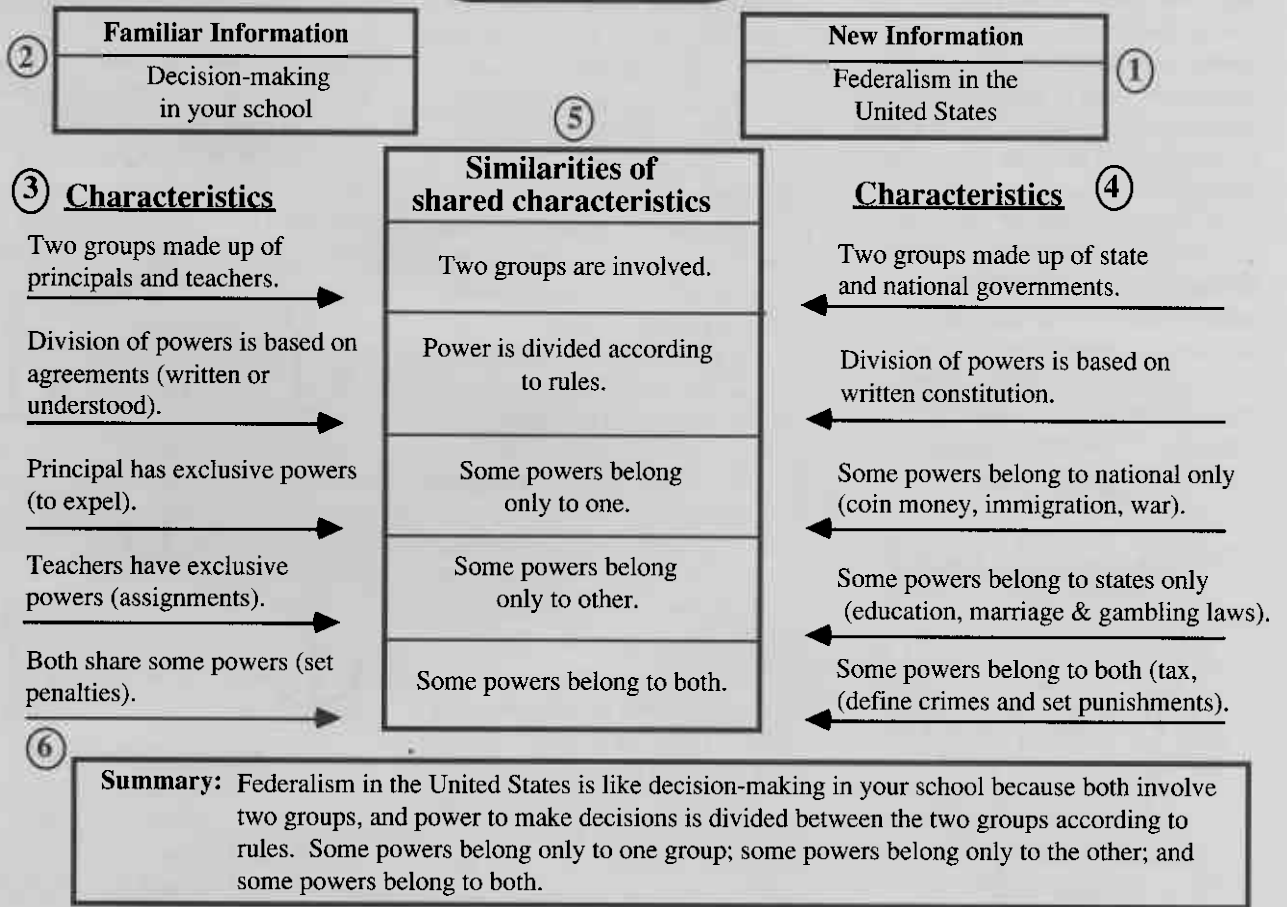
"We will be following the steps of the Anchoring Routine as cued by the numbers on the Anchoring Table. Before we start, I will always remind you about using the Anchoring Table, taking notes, and why this information is important. In addition, remember that as we develop the Anchoring Table together, we will follow the numbered steps to accomplish the following: 1) write the name new concept that we will consider; 2) write the name of a familiar topic that we can use as an analogy to understand the new concept better; 3) work together to clarify the characteristics of the familiar topic; 4) work together to understand the characteristics of the familiar topic; 5) identify the similarities between the characteristics of the new and familiar concept; and 6) review our new understanding by developing a summary that tells how the two concept are similar. Finally, we will always review both the concept or topic to be sure we all understand. We will also review the process involved in using the steps of the Anchoring Routine."

Using the Anchoring Routine

The use of an Anchoring Routine can

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Anchoring Table



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be illustrated with the concept of "federalism." A teacher might say something like the following: "Today, we are going to talk about the concept of 'federalism in the United States.' We have been talking about forms of government, and this word is often used but possibly misunderstood by many. Since our upcoming project focuses on federalism and how you function as citizens in a federalist government, it is important that you understand it thoroughly. Be sure to take notes as we discuss this. I am handing out an Anchoring Table for us to fill in together.

I have already announced to you the name of the new concept we will develop together today, that is, the concept of 'federalism in the United States. Let's all put the word

'federalism in the United States' in the box at the upper right corner of the Anchoring Table under the words "New Information" labeled with the number '1.' Now, I have tried to think of the name of something with which you are all familiar for us to use in creating an analogy. There may be other good concepts for an analogy, but I think we should explore some aspects of our school as an analogy. Therefore, write 'decision-making in our school' in the box at the upper left corner of the Anchoring Table under the words 'Familiar Information' labeled with the number '2.'

Now, let's clarify what we understand about some characteristics of our school. What do you understand about who has what powers in a school? Think carefully about what powers the principal has

and what powers the teachers have."

Set up the analogy that powers are divided between two groups made up of a principal(s) and teachers and that the division of powers is based on agreements that may be written or understood depending on your school. Then, work with the students to clarify the fact that the principal has some powers exclusively, such as the power to expel students. Based on your assessment of the level of student understanding about how your school functions, you might add other characteristics having to do with budgeting, scheduling, calling teachers' meetings, adjusting school schedules, and monitoring equipment and supplies. The teachers, on the other hand, have the power to make assignments in class. Again, you

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might add other characteristics: setting class rules, scheduling time within class sessions, and assigning students to work in groups. However, there are other powers that are shared by the teachers and principals. For example, both the teachers and principal might each set penalties for tardiness, the principal dealing with tardiness in entering the school building and the teacher with tardiness in entering the classroom. You might include other examples that you know to be true for your school such as deciding which



textbooks to use, or enforcing rules of behavior in the hallways. Then, fill out the column labeled 'characteristics' under the box labeled 'familiar information' in which everyone has written the words 'decision-making in your school.'

Work with the students to understand the characteristics involved in the concept of federalism and to fill in the lines under the word 'characteristics' under the box labeled 'new information' in which everyone has written the word 'federalism in the United States.' Students can be led to see that there are two groups made up of state and national governments, and that there is a division of powers based on a written constitution. Then, you can work with them to be sure that

they understand the national government has some powers exclusively. Select what is important for you to teach depending on the level of students you are teaching. Characteristics might include the powers to coin money, regulate immigration, declare war, etc. Establish that state governments have some powers exclusively such as providing education, making marriage laws, gambling laws, etc. Finally, work with the students to form an understanding about the powers the national and state governments share such as the power to tax the people, define crimes, and set punishments.

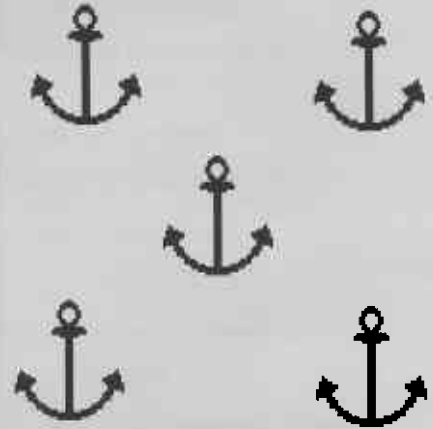
Then the similarities of the shared characteristics can be explored. This is done by discussing with the students how each of the characteristics of a school and each of the characteristics of federalism are similar. These are written in the lines in the center of the page identified as 'similarities of shared characteristics' and labeled with the number '5.'

Work with the students so that the characteristics reflect a higher order of understanding. For example, students need to understand that "two groups are involved" and that "power is divided according to rules." This allows exploration the strength of a written constitution and a division of powers. In addition, if the principal has some powers exclusively and the national government has some powers exclusively, a way to describe both is that "some powers belong only to one." Similarly if the teacher has powers exclusively and the state government has powers exclusively, then "some powers belong only to the other." But, an important point is that the teacher and principal and the national and state government share powers. Therefore, "some powers belong to both" is the similarity.

When students understand this, the class can help to construct a summary statement that restates why federalism in the United States can be compared

to decision making in the school. See **Anchoring table summary on page 3.**

The planning and use of the Analogical Anchoring Routine always involves these steps. However, teachers sometimes present steps "3," "4," and "5" in a different order than suggested here. For example, the similarities of shared characteristics



may be developed before the characteristics of the new information. Nevertheless, the important components of building new understanding based on prior knowledge of a well-known concept, identifying critical characteristics, generalizing information and creating a good summary are always present when using Analogical Anchoring. The ultimate goal is that teachers have at their disposal a technique to compensate for students' lack of prior knowledge about an important concept. ■

Strategram

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Editor

Mary Lee

Consulting Editors

Keith Lenz

Don Deshler

Jean Schumaker

WILL EDUCATION REALLY CHANGE? Reform & Restructure

Martha C. Beech
Center for Educational Technology
Florida State University

There is growing perception that the schools in this nation are not producing the highly skilled workers needed for a successful economy in the 21st century. Many people believe that the most important purpose of school is to prepare students to get a job, and many sources say that employment opportunities in the future will require college or other postsecondary training even for entry-level employment. In the workplace, employers are concerned about the lack of basic literacy and employability skills in many of their workers. Recent publications such as *Workplace Basics* (1988) and *What Work Requires of Schools* from the Secretary's Commission on Achieving Necessary Skills (SCANS) (1991) indicate that the outcomes of schooling must change (See Table 1). Traditional basic skills in reading, writing, and arithmetic must be augmented by critical thinking and decision-making.

New ways of working and living in our society are evolving from scientific breakthrough, experimentation, and innovation. The crucial resource of the future will not be money or labor, but knowledge managed by technology. Banathy (1991) describes this shift as moving from an industrial to a technological society. He indicates that processes in the new society will be organized around intelligent technology for information and knowledge development. Technology will not invent and manufacture as much as it will process information, communicate, and network. A global consciousness will replace national consciousness. Clearly a new paradigm for education is needed.

A paradigm shift—not a pendulum swing

The incidence of reform and restructuring efforts indicate that American education is moving toward a major shift in the practices and beliefs that serve as its paradigm. Our current educational system meets the needs of society under the paradigm of an industrial and agricultural era. "A strong back, the willingness to work, and a high school diploma were once all that was needed to make a start in America. They are no longer. A well-developed mind, a passion to learn, and the ability to put knowledge to work are the new keys to the future of our young people" (*What Work Requires of Schools*, 1991, p. 1).

Changes are surfacing in the fundamental beliefs and practices that have guided education for the past 100 years.

What should be studied? When should students be in school? How should students be grouped? How should students be instructed? How should students be tested? Almost no existing practice or belief is left unchallenged. The paradigm of education is shifting to support the belief that all children can acquire the skills and competencies that are necessary for successful performance of adult roles. Schooling can provide the necessary conditions and experiences to facilitate their learning. When schooling is learning-centered rather than teaching-centered, a different set of priorities arise for the use of resources, rewards, and organizational practices.

Re-examining the mission of schooling

A re-examination of the mission, or purpose of schooling, is a common element in many educational reform efforts. The underlying assumption is that if we know what we're aiming for, we can marshal the resources to achieve it. If the primary purpose of schooling is to help students acquire the foundation skills and competencies such as those identified by SCANS as necessary for success in adult life, then the requirements, practices, and policies have to be designed specifically to support this mission.

This re-examination of mission of public school education is occurring across the nation. Florida and other states and local districts are incorporating the SCANS foundation skills and competencies into the performance requirements for students. Graduation requirements are expected to change from Carnegie units and subject-matter credits to a demonstration of competencies in these outcomes. Other states are also moving towards an outcomes-based education approach. Recently, Pennsylvania adopted performance outcomes, and Virginia, Oklahoma, and Nebraska are in the process of developing them (Spady, 1992). The public seeks a clearer definition of educational programs in terms of what they are preparing students to be able to do. For much of education, there is a minimal connection between what students do and learn in school and what they will need in the real world, even the "real world" of postsecondary education. Research will be needed to continue to identify the knowledge, skills, and attitudes that will be essential for the 21st century.

National Standards and Curriculum Reform

Numerous organizations are in the process of developing national goals and standards which reflect the broad consensus of their disciplines in fields such as science, math, and humanities. Reports have been issued by the National Council of Teachers of Mathematics and the American Association for the Advancement of Science. Similar efforts are planned by the National Council for History Standards, the National Council for

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Geographic Education, the International Reading Association, and the National Council of Teachers of English. Standards are also being developed by the Consortium of National Arts Education Associations and the National Association for Sport and Physical Education. Educators theorize that clearly articulated standards can

information and tools to use that information can be provided to all students. The influence of technology induced changes will be seen as simulations; personalized and intelligent tutoring systems and multi-dimensional instruction will be provided on-line and *just in time*.

The roles of the participants in education are reconceptualized as the teacher shifts from transmitter of

Table 1

What Work Requires of Schools (1991)

Foundation Skills

1. Basic skills: Reads, writes, performs arithmetic and mathematical operations, listens and speaks.
2. Thinking skills: Thinks creatively, makes decisions, solves problems, visualizes, knows how to learn and reasons.
3. Personal Qualities: Displays responsibility, self-esteem, socialability, self-management, and integrity and honesty.

Competencies

1. Resources: Identifies, organizes, plans, and allocates resources.
2. Interpersonal: Works with others.
3. Information: Acquires and uses information.
4. Systems: Understands complex inter-relationships.
5. Technology: Works with a variety of technologies.

knowledge to coach, model, or facilitator. A learning-centered approach emphasizes the importance of having students become actively involved in their learning. Students are expected to explore, assess, and revise their ideas over extended periods of time (*Schoolyear 2000 Design Principles*, 1992). Authority structures in the schools may change as the learning centered approach becomes pervasive. Students become knowledge-workers and the traditional dependency relationship of teacher and student is changed. Old Deweyian ideas are being reborn in many of the reform efforts with an emphasis on projects with depth,

stimulate improved performance in school as well as the workplace.

In an analysis of the development of these national standards and related curriculum reforms, Anne Lewis (1990) identifies common themes that support the paradigm shift in education.

- Increased emphasis on higher-order thinking and complex problem-solving skills.
- More rigorous content for all students with an emphasis on substantive knowledge and application in authentic contexts.
- Integrated and interdisciplinary study of curricula with the connections between the disciplines clearly identified.
- Change in curriculum sponsored and initiated by outside groups such as the National Geographic Society and the National Science Foundation.
- Acknowledgement of the limits of standardized testing and promotion of authentic assessment methods which document actual performance.

A learning-centered approach

Modern research in learning and motivation has contributed to the paradigm shift of a learning-centered approach. The entire system of schooling must be organized to promote, facilitate, and support learning for all those eligible to use the system. Learning environments must be responsive to student needs and enable them to work effectively and efficiently. Access to

complexity, duration, and relevance to the real world that teach students to be mastery-oriented, not ability-oriented (Wigginton, et al, 1991; Sizer, 1992; Berliner, 1992).

The following table on page 7 compares the current paradigm of education with what author, Gloria Gery, refers to as "reality" (1991). This "reality" reflects the learning centered approach.

Is anybody doing this?

The mission of the *Florida Schoolyear 2000 Initiative* is to enable all learners to acquire the foundation skills and competencies needed to enter the "adult world" of the 21st century successfully. The Center for Educational Technology at Florida State University, is directing a multi-year Initiative to design and implement a model of schooling that will be based on a learning centered paradigm of education. This Initiative involves a collaborative effort of the Florida Department of Education, Florida State University, and seven local school districts that have identified feeder patterns of schools to serve as the operational test sites.

Schoolyear 2000 is a redesign of the total system of schooling involving the development of ten coordinated subsystems. These subsystems include mission, research and development, curriculum, instruction, student and family services, management operations, logistical services, human resource development, assessment and information management, and evaluation. Each of these subsystems will interrelate to insure that the system

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Table 2

Comparison of Paradigms in Education

Current Paradigm of Education	Reality - The Paradigm Shift
<i>Education or schooling</i> is an event with a beginning and an end. It occurs within a time and place. Only so much can be done within that time and place.	Learning is a process, not an event.
The <i>population of students</i> can be defined and is relatively homogeneous.	Groups of learners are rarely similar in entry knowledge, learning style, motivation, or needs.
<i>Instruction</i> must be consistent for all learners to assure they all "get" the same message.	Learners control what they learn and retain.
<i>Students</i> see a need to learn what the <i>teacher</i> sees as important. <i>Students</i> trust the <i>teacher's</i> view implicitly and absorb the <i>teacher's</i> motivation to teach as their motivation to learn.	When information is forced on people out of context, it is difficult to obtain or maintain their attention.
<i>Students</i> require someone else who "knows better" to structure and sequence their learning experiences and to assess their learning. Without externally imposed structure, learners will be frustrated or incapable of learning; self-directed learning will be inefficient or inadequate.	Learners will learn in the most efficient and effective way for them personally.
<i>Students</i> must know certain things before they can do anything (i.e., cognitive knowledge must precede experiential knowledge.)	When provided with a model, learners can assess their own knowledge and skill without involvement of others.
Teaching <i>students</i> "about things will translate into their being able to "do" things <i>after they leave school</i> .	In order to become more proficient at anything people must have sufficient practice in actually doing the task.
<i>Curriculum</i> designers know better than individuals or groups of <i>students</i> how those learners best learn (i.e., content, sequence, instructional strategy, nature and amount of practice required, media, and so forth.)	Consistent <i>instructional</i> experiences produce inconsistent and unpredictable learning outcomes because of the diversity of learners.
There will be adequate <i>post-school</i> support systems available on the job. What happens <i>after the student leaves school</i> is out of the <i>teacher's</i> control. Further knowledge and skill development becomes the supervisor's or employee's responsibility.	Most <i>post-school</i> support is unstructured, inconsistent, inadequate, or <i>nonexistent</i> .

Note: This table has been adapted from ideas presented by Gloria Gery in her text *Electronic Performance Support Systems* (1991).

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continues to meet society's demands and priorities. The model incorporates a capacity for change and improvement on an ongoing basis and a quality system that meets the International Standards Organization 9000 Series criteria. An electronic system supports the learner

in technology-based access to information, communication, and tools of learning and creating; it also enables parents and members of the community to support learners. More information about the Initiative is available from the author.

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Will Education Really Change?
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What about the Strategies Intervention Model?

The Strategies Intervention Model (KU-IRLD) has been shifting the paradigm in special education for the last decade. The model was designed by first researching the setting demands and characteristics of low-achieving adolescents to identify the needs or purpose, then building the curriculum, instruction, and assessment procedures to accomplish that purpose. In addition, the model has been expanded to address the enhancement of the instructional environment, both in the special education classroom and in the mainstream.

The stages of instruction can be enhanced by the application of technology to assist learners in the practice and feedback processes. With the reduction in "pull-out" programs and separate classes for mildly handicapped students, alternative techniques will be needed to ensure that these students have access to the intense instruction and guided practice that enables them to learn. Learning systems might incorporate intelligent tutors and use electronic tools similar to existing word processing software with spell-check and grammar-check features.

The enhancement of the educational environment will also need to include communication tools so that teachers and students can collaborate with each other, regardless of where they are located. Teachers with networked workstations can easily share ideas with each other and solve problems collectively. Electronic mail can also be used to enable high school students to establish a mentor relationship with college students, for example. The high school students may send drafts of their written work to college students for feedback and assistance. The college students may use the high school students to react to their projects. Learners who have attained competencies in particular strategies can assist others. Generalization and application of strategies to new contexts can be facilitated through modeling and cueing by competent learners. Without too much imagination, these relationships could easily be established with individuals across the globe.

Conclusion

The extent of the impact of a shift in paradigm to a learning centered approach is now beginning to be realized across many facets of education. In many ways, the special education movement and programs like the Strategies Intervention Model are forerunners of the learning centered approach for all students. The push for change comes strongly from factors outside the education community. The requirements of society in the Information Age can not be met through the existing models of schooling. ■

The University of Kansas
Center for Research on Learning
Rm. 3061 Robert Dole Bldg.
Lawrence, Kansas 66045-2342
1-913-864-4780

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