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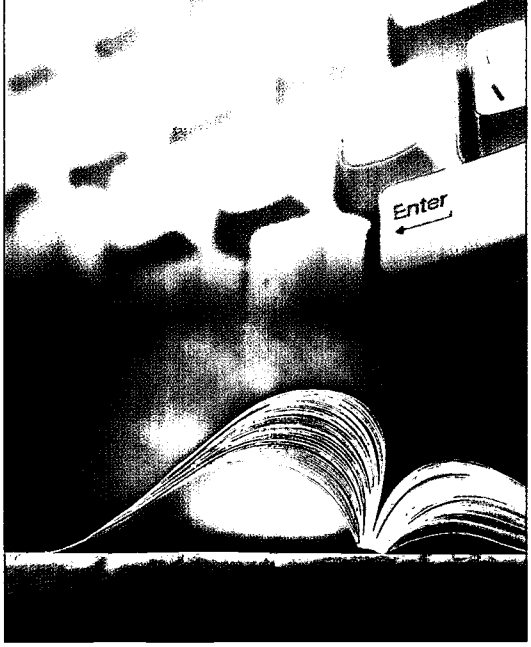
ABSTRACT

Engaging in lifelong learning is rapidly changing from an option to a necessity for remunerative employment, competent citizenship, and everyday personal life. This booklet examines why today's students need to become lifelong learners, the kinds of attitudes and skills required, and the kinds of preschool-through-grade-12 educational practices that best prepare youngsters to become lifelong learners. Half of the documents summarized are reports of research studies; the remainder are futurist documents, theory papers, program descriptions, and statements of expert opinion. Early childhood education should de-emphasize academics and be child-centered and socially oriented. School-age children perform best when the focus is on learning, not competing, when tasks are clear and personally relevant, when they are challenged and expected to do well, and when they have personable teachers to engage their interest. The skills associated with lifelong learning include communication skills, self-directed learning skills, research and library skills, study skills and learning strategies, metacognition, higher order thinking skills, and learning-style awareness. Teacher and family roles are outlined. Contains an annotated bibliography of 30 key references and 73 additional references. (MLH)



Research
You Can Use
Lifelong
Learning

Booklet 5

Education for Lifelong Learning Literature Synthesis

Northwest Regional Educational Laboratory

School Improvement Program

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March 1998

Research You Can Use Lifelong Learning

Booklet 5

Education for Lifelong Learning Literature Synthesis

Kathleen Cotton

Northwest Regional Educational Laboratory

School Improvement Program
Robert E. Blum, Director

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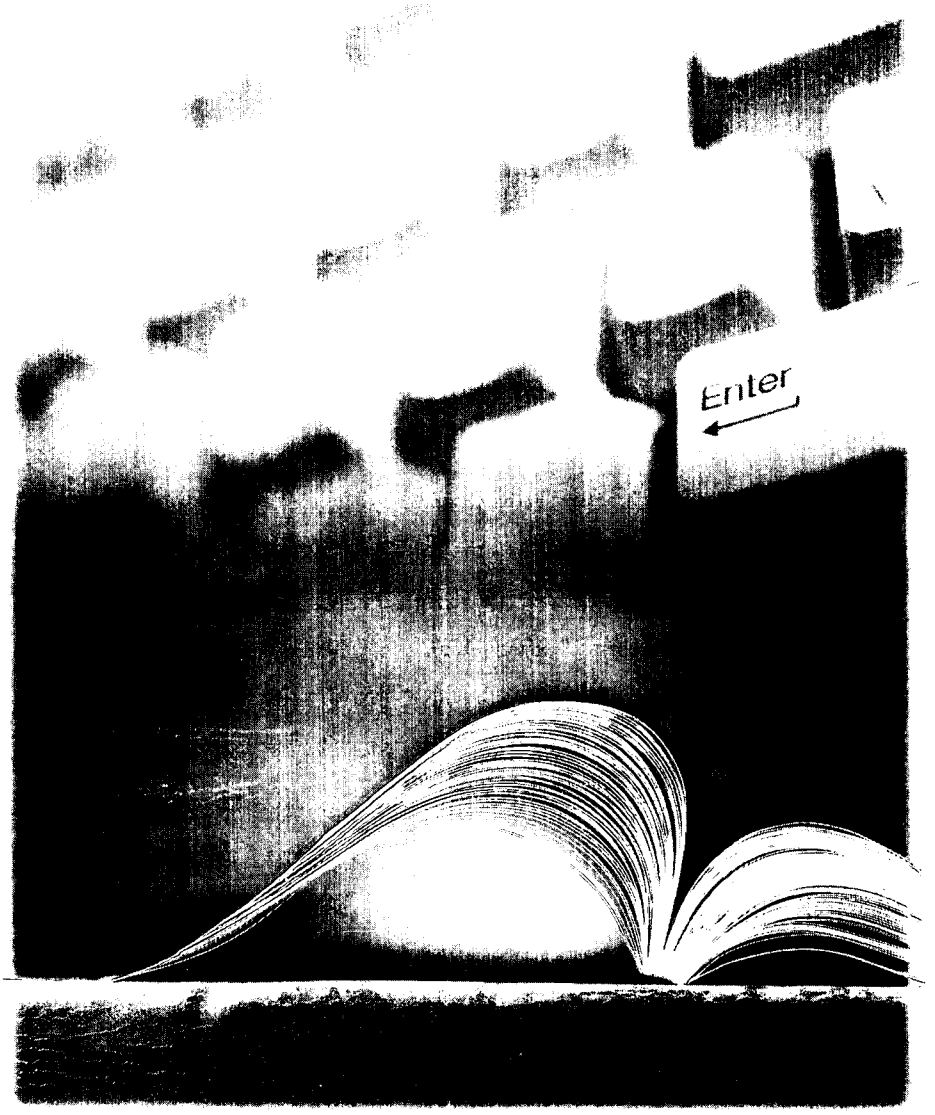
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Part 1:

Background Information

The first and most basic principle of an intelligent curriculum: it must equip young people to be lifelong learners.

— Edward Cornish, 1986

Individuals may need to engage in a lifetime of learning not as a matter of choice but as a matter of survival.

— Dennis D. Gooler, 1990

What Is Lifelong Learning?

Time was when "lifelong learning" referred primarily to the optional pursuit of learning by adults wishing to make productive use of their leisure time. While this is still one meaning of the term, it is no longer the most significant one. Instead, engaging in lifelong learning is rapidly changing from an option to a necessity for remunerative employment, competent citizenship, and everyday personal life.

The knowledge and support people need to engage in lifelong learning vary according to each person's age, learning strengths, current learning need, and other factors. For those of us who are concerned with the development and education of children and youth, key questions include:

- Why do today's students need to become lifelong learners?
- What kinds of attitudes and skills does lifelong learning require?
- What kinds of preschool-through-grade-12 educational practices can best prepare young people to become lifelong learners?

Drawing upon the lifelong learning research and other professional literature, this paper addresses these questions.

Research You Can Use Lifelong Learning

Lifelong learning is...the process by which individuals continue to develop their knowledge, skills, and attitudes over their lifetimes.

—Barbara Lieb, et al., 1993

Why Do People Need To Become Lifelong Learners?

The information explosion >

In most fields of study information and knowledge are doubling every three to ten years. New fields of study are rapidly emerging. As new knowledge becomes available, existing information becomes obsolete.

—Gail Caissy, 1986

Lifelong learning...is a necessity for employment.

—Betty P. Cleaver, 1987

The workplace >

Career change likely >

More information is being generated than ever before, and developments in communications technology continue to make this information more widely available. As our society becomes more information oriented and more economically dependent on the effective use of knowledge, so grows the need for citizens to be able to find and use information in order to be successful.

Benjamin writes that, "in line with the growing complexity of modern society and the corresponding need for people to have access to a greater variety of educational resources at differing stages of their lives, education will continue to become more of a lifelong enterprise" (1992, p. 52).

This is a far cry from adult hobbyists casting about for activities to fill their leisure hours. As Gooler points out, citizens may no longer have the option of choosing not to pursue learning activities continually throughout their lives. Our ability to function effectively in the workplace, home, and community may well require us to keep accessing and processing information, developing new skills, and generally coping with rapid change (1992, p. 321).

The proliferation of information and information technology is strongly felt in the American workplace, and all indications are that this trend will continue. We can expect both a continual increase in work-relevant knowledge and continual development of technologies for generating and processing information.

A few excerpts from the research and "futurist" literature will serve to illustrate the demands upon tomorrow's workers and underscore the accompanying need for them to engage in lifelong learning:

- "As adults, [today's students] will have to take special courses to hold their future jobs and qualify for others. They may even have to switch

careers four or five times as new technology and changing social needs keep the economy in constant turmoil" (Cornish 1986, p. 13).

- "The workplace of the present and future demands a new kind of worker. Reading and arithmetic ability simply are not enough. In a global marketplace, data is [sic] dispatched in picoseconds and gigabits. The deluge of information must be sorted, evaluated, and applied, and workers must be able to gather, synthesize, interpret, and evaluate" (Hancock 1993, p. 4).

< Employers need "a new kind of worker"

- "The current consensus is that technology has not simplified work. Instead, what technology has done is eliminate many low-level jobs ...and increased the skill levels required for those that remain" (Imel 1994, p. 3).

< New technologies require sophisticated employees

- "Workers will be required to offer their views in a community characterized by inquiry and common discourse and be less dependent on supervisors or trainers to meet their needs or solve their problems" (Cummings 1992, p. 9).

- "Many kinds of routinized, repetitive work have been completely eliminated...the factory employees and office workers of today must be able to perform increasingly more sophisticated operations, such as operating computers and analyzing data" (Cotton 1993, p. 5).

What Is the National Response To These Trends?

< Lifelong learning a national educational goal

In light of the information explosion and accompanying workplace requirements, the U.S. Congress included, as part of its *Goals 2000: Educate America Act* (1994), a goal titled "Adult Literacy and Lifelong Learning" (now Goal 5). This goal area calls for such things as opportunities for workers to upgrade their skills through schooling opportunities and workplace-sponsored education, and increased programming for the many mid-career workers who must upgrade their knowledge and skills.

Many initiatives have been undertaken to achieve the objectives of Goal 5—both for adult workers and for students who will need to engage in lifelong learning.

What Are the Traits and Skills of a Lifelong Learner?

To prepare young people "to develop their knowledge, skills, and attitudes over their lifetimes," we need to know what qualities are needed for successful lifelong learning. Researchers, futurists, and others have identified many traits and skills as essential for the lifelong learning demands of the present and future.

Traits: >
Curiosity
Motivation
Responsibility
Confidence
Teamwork
Independence
Persistence
Flexibility

Lifelong learners have lifelong curiosity. They are motivated to learn and express this motivation by assuming most of the responsibility for their own learning. They are confident of their ability to learn new things and actively seek out learning resources and the information they contain.

They work well with other people—including those who are culturally different from themselves—in team-learning situations; and they are eager to learn from others, willing to share what they know, and open to feedback. Just as important, they can engage in sustained, independent learning projects.

Lifelong learners are willing to make mistakes and learn from them, and they are persistent. They are flexible and able to defer drawing conclusions until they have gathered and considered sufficient information.[1]

Communication Skills: >
Reading, Writing,
Speaking, Listening
Other Skills:
Self-directed learning
Research Skills
Library Skills
Study Skills

Successful lifelong learners have well-developed *communication skills*—the reading, writing, speaking, and listening skills that facilitate the acquisition, processing, and transmission of knowledge. They possess *self-directed learning skills*—skills for determining what needs to be learned and then planning and carrying out a learning program.

They have the *research and library skills* needed for identifying, retrieving, organizing, and making use of ever-increasing amounts of information. Lifelong learners are adept at a variety of *study skills* and *learning*

[1] These lifelong learner attributes are drawn from the work of Ames and Archer (1987); Brophy (1987); Candy (1990); Carr (1991); Cotton (1993); Dickinson (1995); Gunzburger (1983); Hattie, Biggs, and Purdie (1996); Katz (1988); Livneh and Livneh (1998); and Munro (1994).

strategies, and they know which ones to apply in different kinds of learning situations.

They have *higher-order thinking skills*—the critical thinking, problem solving, decision making, and inquiry skills that enable them to evaluate and synthesize knowledge.

< Higher-Order Thinking Skills

Lifelong learners also make use of *metacognitive skills*, including self-awareness, reflection, self-monitoring, and affirmative self-talk to assess how well the learning process is proceeding and to identify and address areas that need more attention. Knowledge of one's own *learning style* supports metacognition by helping the learner to identify situations where alternative teaching and learning methods might enhance one's learning.

< Metacognitive Skills

< Learning Style

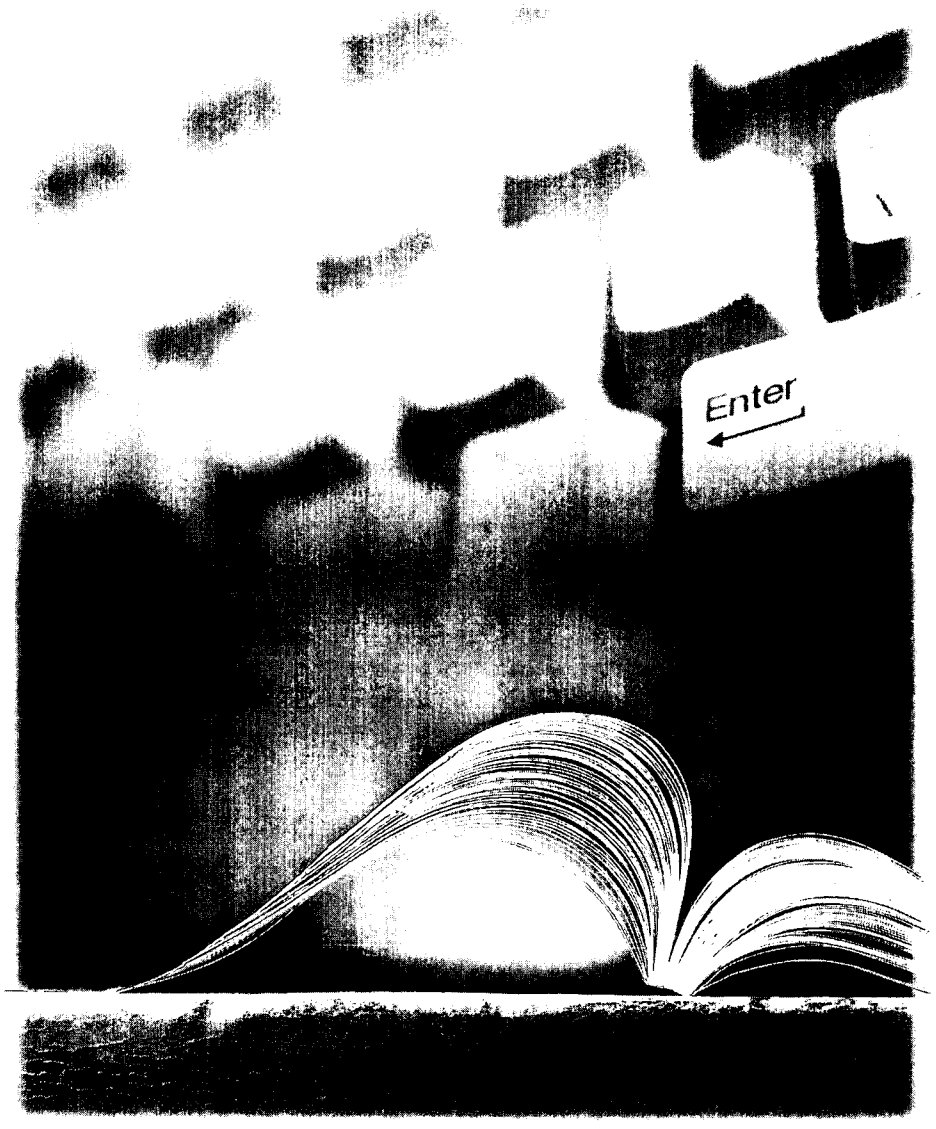
Does the Literature Tell Us How To Develop Lifelong Learners?

The literature identifies attributes that lifelong learners tend to have in common. Educational theory and research identifies practices for inculcating these attributes in our students.

So although the literature does not directly trace the use of specific educational practices with a group of students to the involvement of those students in lifelong learning experiences, researchers *have* identified strong correlations among educational practices, learning skills, traits, and lifelong learning.

< Research points the way

This paper summarizes 101 documents, about half of which are reports of research studies and the rest futurist documents, theory papers, program descriptions, and statements of expert opinion. The research reports identify relationships between educational practices and the development of the learning skills and dispositions that characterize lifelong learners.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Part 2:

Research Findings

Personal Traits for Lifelong Learning

Recognizing that learners must be willing to learn in order for learning to occur, scholars have given a great deal of attention to the subjects of learning motivation and persistence.

The best in science, scholarship, or art cannot be coerced from an unwilling heart.

—Raymond J. Wlodkowski, 1991

Looking first at the research on preschool and kindergarten children,[2] we find that, as researcher Lilian Katz puts it, "some early childhood education practices undermine the disposition to go on learning" (1988, p. 15). Although recent years have seen a trend toward exposing children to academic tasks at earlier and earlier ages, research shows that this is counterproductive in the long run.

< Preschool and kindergarten children

Introducing children to formal academic work prior to first grade does enable them to acquire skills and produces immediate gains in test results, *but it does so at the expense of the disposition to use the acquired skills.* That is, according to longitudinal studies of children educated in academically oriented programs beginning in preschool, these children tend to have *less* learning motivation during their school years than those who had participated in child-centered, socially oriented programs.

< Avoid academics too early

Those who participated in the child-centered programs have also been shown to rate their abilities higher, have higher expectations for school success, show less dependency on adults for permission and approval, express more pride in their accomplishments, and worry less about school.

< Child-centered programs

[2] Research findings are reported in Katz (1988); Multon, Brown, and Lent (1991); Ramey and Ramey (1994); Scott (1996), Stipek, et al. (1995); and Wlodkowski (1991).

Best learning environment for young children >

The kind of learning environment shown by research to foster learning motivation and readiness in these small children includes:

- Teaching and materials that are responsive to each child's needs, preferences and individual stage of development
- Teachers and aides who communicate enthusiasm for learning
- Emphasis on *learning* ("Let's see how much you can find out") rather than *performance* ("Let's see how many you can get right")
- Sufficient variety and stimulation to capture and hold children's attention
- Surroundings that are trustworthy and comprehensible from the child's point of view
- Encouragement of curiosity and exploration
- Safety from inappropriate disapproval, teasing, or punishment
- Language richness—to convey information, provide social rewards, and encourage new learning
- Specific, sparing positive feedback; *not* continuous or information-free feedback
- Learning activities that have immediate relevance and application
- Mixed-age groupings

School-age children >

Research with older students has found, not surprisingly, that possessing a repertoire of effective learning skills enhances learning motivation and willingness to follow through on learning tasks. Researchers[3] have also found that students' interest in learning is greater when:

Focus on *learning*, not competing >

- Parents and teachers stress mastery of learning content and improvement over time, rather than high performance in relation to other students.

[3]Findings are from the work of Bergin (1995); Brophy (1987); Candy (1990); Dickinson (1995); Hattie, Biggs, and Purdie (1996); Hootstein (1994); Katz (1988); Koskinen, Morrow, and Sharkey (1993); Multon, Brown, and Lent (1991); Oldfather (1993); Ornstein (1994); Scott (1996); Story and Sullivan (1986); Virgil (1994); and Wlodkowski (1991).

- Teachers are enthusiastic and create a supportive learning environment in which students' ideas are welcomed and respected.
- Teachers clearly state objectives for learning activities and provide advance organizers to structure learning.
- Teachers connect learning tasks to things or events that have meaning and relevance for students' own lives.
- Teachers provide concrete, familiar referents for abstract content—especially with younger children.
- Teachers assign learning tasks that are difficult enough to be challenging, but not so difficult as to be frustrating.
- Teachers communicate the expectation that students can and will perform the tasks successfully.
- Teachers communicate and reinforce to students that learning success depends primarily on effort—not native ability or luck.
- Teachers' praise or rewards are contingent on success or improvement and are used sparingly.
- Teachers allow students to make some choices about learning activities.
- Teachers provide opportunities for students to interact with peers in group learning activities.
- Teachers introduce elements of mystery or suspense to stimulate students' curiosity.
- Teachers use anecdotes, analogies, humor, and the interjection of personal and emotional elements to engage students' interest.
- Teachers provide assistance and support when students become frustrated or lose their momentum on learning tasks.
- Students have adequate time for thoughtful completion of the learning tasks.
- Students have previous experiences of learning success.

< Clear tasks of personal relevance

< Challenges and high expectations for student effort and success

< Personable teachers who stir up student interest

Researchers also note that lifelong learning in an increasingly multicultural society requires that we be able to engage productively in school, social, and work interactions with many different kinds of people.

Multicultural activities, bilingual education, and prejudice reduction >

In addition to general communication skills (see the following section), the 21st century lifelong learner will also need to develop and express respect for cultural differences and be able to learn from—and with—culturally diverse groups. A growing body of research[4] identifies practices that can start children on the road to cross-cultural understanding and harmony. Some key practices include:

- Multicultural education for students of all ages, including (1) direct teaching about the attributes of different cultural groups, (2) curriculum materials that reflect cultural diversity, and (3) providing a place for languages other than English in instruction.
- Cooperative learning activities involving culturally heterogeneous groupings.
- Activities to reduce intercultural prejudice and increase empathy, including books, films, video and stage presentations that reveal the unfairness of prejudice and the harm it causes.
- Critical thinking activities that reveal the irrationality of prejudicial thinking.

The single most important competence that people must possess is the ability to learn—with, or, more important, without a teacher.

—Malcolm S. Knowles, 1990

Learning Skills

Learning skills are interconnected >

The first point to be made about the skills associated with lifelong learning is that they are not separated and distinct from one another. *Communication skills*, for example, are interwoven with all other skill areas. *Higher-order thinking* and *metacognition* overlap one another, and we could say that the skills of *self-directed learning* incorporate all of the other skill areas.

Since these areas are addressed separately in the research, however, I maintain the distinctions here, with the understanding that the separation is somewhat artificial.

[4]Methods for fostering positive intercultural relations may be found in the work of Byrnes (1988); Cotton (1993); DeVries, Edwards, and Slavin (1978); Garcia, Powell, and Sanchez (1990); Pate (1988); Slavin (1985); and Sleeter and Grant (1987).

Communication Skills: Reading, Writing, Speaking, Listening

Never before has facility with the written and spoken word been more important in the workplace and in society generally.

The kinds of present and future activities discussed in this summary—team projects in school and the workplace; decision making by workers at all levels; identifying, retrieving, analyzing, and applying ever-growing amounts of information—all require a high level of ability to read, write, speak, and listen.

Specific occupational skills are less crucial for entry-level employment than a generally high level of literacy, responsible attitudes toward work, the ability to communicate well, and the ability to continue to learn.

—Committee for Economic Development, 1985 (quoted in Cotton 1991, p. 6)

Research[5] indicates that these communication skills are best developed via methods which emphasize the interrelationships among them.

< Effective teachers integrate language arts

Research-based recommendations for developing literacy and other communication skills include the following:

Provide language-rich environments for students of all ages, with many kinds of reading materials.

< Language-rich environments

- Include plenty of opportunity for student choice of material to read.
- Include materials from various genres.
- Include materials for a wide range of reading abilities.
- Include materials that relate to students' established interests.

Devote generous amounts of in-class time for actual text reading.

< Plenty of time to read

- Have students work with "everyday text—not just specially constructed materials or short workbook passages" (Fielding and Pearson 1994, p. 65).
- Rule of thumb: Give students more time to read than the combined total allocated for learning about reading and talking or writing about what has been read.
- In addition to sustained silent reading, reading aloud in small groups is appropriate for students up through the middle grades.

Give instruction and practice in comprehension strategies.

< Comprehension strategies

- Examples include using background knowledge to make inferences, getting the main idea from a passage, detecting critical details, summarizing, making comparisons between readings, and identifying the author's point of view.

[5]Findings about communication skills are drawn from the work of Cotton (1988); Crowell (1989); Duncan and Goggin (1982); Fielding and Pearson (1994); Guthrie, McGough, and Bennett (1994); Hoff (1994); Katz (1988); Morrow, Sharkey, and Firestone (1993); Rauch (1992); Ruddell (1995); Virgil (1994); and Wood (1993).

- Provide strategy instruction in the context of text reading.
- Explain and model strategies.
- Give students guided practice, then independent practice with feedback.
- Emphasize to students that comprehension strategies are applicable to learning in other situations, both in and out of school.

Peer and collaborative learning >

Group students for peer and collaborative learning.

- Allow student to learn about one another's thinking processes in collaborative pairs and groups.
- Keep goals group oriented, with the criterion of success being satisfactory learning by each group member.
- Teach and expect students to explain things to one another—not merely give one another answers.
- Have students engage in reciprocal teaching, in which they take turns leading dialogues that call for summarizing, asking questions, predicting, and clarifying.

Student discussion of readings >

Provide opportunities for students to discuss their responses to material they have read.

- Allow student input to drive discussions.
- Use students' personal interpretations as occasions to assist them in developing, expressing, and defending their points of view.
- Encourage the whole range of responses, from the literal to the critical and evaluative.
- Work with students to clarify the basic meaning of the text when there are confusions or disagreements.
- Encourage students to use the views of their classmates, teacher, and published critics to help clarify their thinking about texts.

Writing practice, writing assessment, and portfolios >

Provide opportunities for students to engage in many kinds of writing and to develop writing assessment skills.

- Use a "process approach" to writing, in which students engage in prewriting, drafting, revising, editing, and publishing their work, with review and feedback from others between steps.
- Provide instruction and practice in writing essays, letters, stories and other creative pieces, journal entries, etc., featuring a combination of teacher- and student-selected topics.
- Allow students to "publish" their writings in classroom or school publications and arrange for them to be read by audiences beyond teachers and classmates, e.g., senior citizen volunteers.

- Provide instruction and practice to students in critiquing their own and one another's writing; teach them to use the same rubrics that teachers use to evaluate student writing.
- Work with students to establish portfolios for their writing and to select examples of their writing for inclusion in the portfolios.
- Focus on development of writing skills over time, rather than attaching too much importance to any one written product.

Self-Directed Learning Skills

The abilities required for self-directed learning[6] cover a broad range. They include the following activities, arranged as a series of steps:

1. Determine what knowledge or skills to acquire or improve.
2. Establish goals and objectives within the selected area(s).
3. Develop action plans which identify and sequence the tasks and approaches for each objective.
4. Develop a timeline based on project scope and externally imposed deadlines.
5. Determine what material, human, and experiential resources are needed and access them.
6. Engage and persist in the learning activities called for in the plan.
7. Monitor one's time use and make adjustments as necessary.
8. Monitor one's learning with periodic self-testing and review.
9. Exhibit newly acquired knowledge or skills for evaluation and/or self-evaluation.
10. Receive critiques from others nondefensively and make use of helpful feedback.
11. Undertake additional learning activities as indicated by the evaluation.

"Classroom practices and conditions can encourage or discourage capabilities and dispositions to engage in self-directed learning," write Thomas, Strage, and Curley (1988, p. 313). They and others[7] are concerned that too many teachers fail to encourage self-directed learning and, instead, treat students as passive and dependent recipients of facts and information.

A self-directed learner is a person who is truly oriented toward lifelong learning... These individuals...know that while information, jobs, beliefs, and behaviors may become obsolete over their lifetime, they have the learning process skills to remain viable and happy.

—D. Scott Ridley, Barbara McCombs, and Kim Taylor, 1994

< Steps of self-directed learning

< Too many teachers foster passivity, dependence

[6]Self-directed learning skills and means for developing them are synthesized from the work of Burak (1993); Caissy (1986); Carr (1991); Cummings (1992); Freppon (1995); Hancock (1993); Hoff (1994); Karp (1993); Katz (1988); Knowles (1984, 1990); Morrow, Sharkey, and Firestone (1993); and Ridley, McCombs, and Taylor (1994).

[7]See, for example, Loranger (1994); Benjamin (1989); Cummings (1992); Diez and Moon (1990); Lieb, et al. (1993); and Oran (1993).

Teachers who are intent on developing self-directed learners "have given up the view that teaching is telling, that learning is absorbing, and that knowledge is static" (Hancock 1993, p. 3). They put students in the role of actively seeking information and constructing meaning from their learning experiences and materials.

How to develop independent learners >

Researchers and other experts recommend to administrators and teachers the following attitudes and practices for developing self-directed learning skills in students:

Trust students >

- Trust in students' ability and willingness to engage in self-directed learning.

Expect apprehension >

- Expect some initial apprehension from students who are unaccustomed to assuming responsibility for their own learning; make certain they understand that guidance will be available to them throughout the process.

Focus on understanding >

- Communicate to students that learning is mostly about discovering connections and making meaning—not memorization or producing "right" answers—and reinforce this by focusing on the *process* of learning—generating ideas, trying them out, identifying relationships, and benefiting from mistakes.

Student practice >

- Teach the steps of self-directed learning and give students examples of and practice in writing goals and objectives and designing learning plans.

Encourage self-direction >

- Provide, for young students, an age-appropriate experience of self-direction by offering a range of choices of learning activities and materials.
- Assume, with older students, the roles of guide, facilitator, and resource person in a learning process that is primarily controlled by the student. "Treat the learners as emerging adults, resist temptations to manage or control every aspect of the learning program," writes Cummings (1992, p. 10).

Encourage teaming >

- Make sure students understand that self-directed learning does not mean learning in isolation, and provide opportunities for them to interact with others as part of their learning projects.

Encourage motivation >

- Become familiar with the list of teacher behaviors that are known to enhance learning motivation and persistence (pages 7-9) and work to incorporate them into instructional practices.

Research and Library Skills

Research and library skills have traditionally been regarded as essential only for students and those whose employment requires these skills. In the information age, however, "people will need to develop sophisticated skills in identifying sources of relevant information, and then gaining access to the information from these sources" (Gooler 1990, p. 322-323).[8]

Developing research skills such as locating, organizing, managing, retrieving, classifying, and storing will be necessary.

—Gail Caissy, 1986

Over and above traditional manual research skills, people will need to know how to access and make use of electronic resources—the Internet, plus databases on CD-Rom and other sources.[9] As Cleaver notes, "it will be important for schools to encourage students to use the technology at hand to access and manage information, a task they may be doing for the rest of their lives" (1987, p. 29).

Given these needs, the researchers recommend that teachers provide instruction in the ways library and database information is organized and accessed, as well as involving their students in hands-on projects that provide practice in applying what they have learned.

< Teachers and librarians

The literature also addresses ways that libraries and library personnel can support the needs of lifelong learners—during and following their involvement in formal education.[10]

Study Skills and Learning Strategies

In an era of lifelong learning, "specific skills . . . will not be as important as the ability to acquire skills" (Caissy 1986, p. 23). Key aspects of this ability are *study skills*, which are tactics for learning and remembering, and *learning strategies*, which are collections of these tactics organized into a series of steps for more in-depth learning.

Learning how to learn involves possessing, or acquiring, the knowledge and skill to learn effectively in whatever learning situation one encounters.

—Hendrik VanDerZee, 1991

Possessing a repertoire of learning strategies and study skills has become increasingly important for success in school, work, and other spheres of life. Identified by researchers and other scholars,[11] some key skills and strategies include the following:

- Underlining, highlighting, repetition, and mnemonic devices are used

< Useful skills and strategies

[8]This need is discussed in Bearman (1984); Caissy (1986); Candy (1990); and Guthrie, McGough, and Bennett (1994).

[9]Skills for accessing electronic resources are addressed in Cleaver (1987); Komoski (1994); Lieb, et al. (1993); Lieberman and Linn (1991); and VanDerZee (1991).

[10]Bearman (1984); Carr (1991); Hancock (1993); Judge (1995); Kaufman (1992); Mathews, Flum, and Whitney (1990); and Salinger (1983).

[11]Descriptions, research support, and guidelines are from the work of Guthrie, et al. (1993); Kenny and Schroeder (1994); Klauer (1988); Loranger (1994); Pintrich and Johnson (1990); Rafoth and DeFabo (1990); Rauch and Fillenworth (1995); and Slavin (1986).

for focusing on and retaining key points in learning material.

- Skimming is used to gather an overall sense of what the learning material is about or to review material quickly; scanning is used to locate particular content without close reading of the entire text.

Organizing learning materials >

- Outlining, categorizing, and concept mapping are used to organize learning material.

Building on known information >

- Forming mental images, making analogies, posing questions, paraphrasing, and analysis of key points are used to make connections between things to be learned and to make inferences about them, i.e., elaboration.

Reinforcing understanding >

- Attending to the organization and structure of source materials (headings, sidebars, italics, pictured items, study questions) is a means of focusing on the material's key points and the relationships among them.

- Taking notes and summarizing are used by learners both to affix important points in their memories and to solidify their understanding of the overall picture of the learning material.

Peer learning >

- Peer learning, such as peer tutoring and cooperative learning, is used to enable students to benefit from one another's knowledge and skills, as well as building the capacity for successful teamwork.

Strategies for in-depth learning >

- Strategies such SQ4R (survey, question, read, reflect, recite, review) incorporate several skills into a series of steps that can be applied to many different kinds of learning material.

- Strategies such as First Degree MURDER (mood, understand, recall, detect, elaborate, review) and Second Degree MURDER (mood, understand, recall, details, expand, respond and review) are used to deepen comprehension and organize one's thinking about learning material—for example, in preparation for testing.

Teaching and reinforcing the skills and strategies >

Findings about the most effective ways to help students develop these skills and strategies include the following:

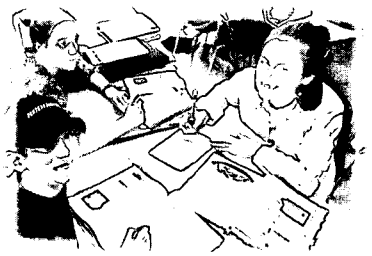
- Reach agreement as a staff about terminology and the teaching and reinforcement of learning skills and strategies.

- Model the use of these methods as a part of classroom instruction.

- Teach the strategies along with the subject-area content being taught,

at least initially, rather than attempting to teach them in isolation from actual learning material. Klauer's research led to the recommendation that students should be "right from the beginning, instructed not only about the subject but also about how to learn it" (1988, p. 21).[12]

- Provide intensive training in the use of strategies so that they are "over-learned."
- Provide guided practice with feedback when students are initially working with the strategies.
- Make students aware of the potential generalizability of strategies taught in one learning context to other contexts and subject areas.
- Familiarize students with the requirements of different test formats and accompanying differences in effective methods of preparation (e.g., a multiple-choice exam requiring that one recognize correct responses calls for a different kind of preparation than a fill-in-the-blank format requiring that one recall information).



Metacognition

Lifelong learners need methods for thinking about subject matter, and they also need methods for thinking about thinking—their own thinking. Metacognition[13] refers to processes in which learners focus on their own thinking and learning processes to determine how well they are grasping and remembering the material they are attempting to master.

An effective study routine and increased metacognitive awareness are the greatest gifts teachers can give students because they empower them, allowing them to manage their own learning.

—Mary Ann Rafoth and Leonard DeFabo, 1990

Some of the learning strategies identified in the previous section—SQ4R, for example—have metacognitive elements. Metacognition includes the following:

< Skills for "thinking about thinking"

- *Self-awareness* is the practice of focusing on the mental approach one will take—or is currently taking—toward the content one is attempting to learn.
- Self-awareness of approach makes possible *self-monitoring*, the ongoing determination of how well one's learning approach is working, as well as the ongoing assessment of one's attitude toward the learning task and content.

[12]The work of Guthrie, McGough, and Bennett (1994); Hattie, Biggs, and Purdie (1996); Katz (1988); Loranger (1994); Pokay and Blumenfeld (1990); Rauch and Fillenworth (1995); and Salinger (1983) supports this approach.

[13]Findings and recommendations regarding metacognition are drawn from the work of Candy (1990); Cotton (1991); Fickeisen (1991); Hattie, Biggs, and Purdie (1996); Klauer (1988); Munro (1994); Pintrich and Johnson (1990); Rafoth and DeFabo (1990); and Slavin (1986).

- The learner then moves to *self-regulation*, the process of making adaptations in one's learning methods as appropriate, based on what he or she learns from self-monitoring.

  —Self-regulation involves ongoing selection from among a range of learning skills and strategies to apply to the learning content.
  —It includes other kinds of decisions as well, such as the decision to read more slowly or to go over learning material a second time.
  —Self-regulation also applies to adjustments learners make based upon their emotional response to the learning material or situation.
  —Self-talk refers to the things learners tell themselves to improve their cognitive or emotional relationship to the learning task.

Modeling metacognitive skills >

According to the researchers and theorists, teachers should teach metacognitive skills explicitly and model them by, for example, speaking aloud to the class the self-awareness, self-monitoring, and self-regulation thoughts they have as they move through a learning process. As with other learning proficiencies, students should be given considerable guided practice in the application of metacognitive skills as they are learning new material.

Higher-Order Thinking Skills

Students and citizens must be able to think critically, uncover bias and propaganda, reason, question, inquire, use the scientific process, remain intellectually flexible, think about complex systems, think holistically, think abstractly, be creative, and view and read critically.

—Steve Benjamin, 1989

Take a look at the quotation to the left. This is a tall order, and advocates such as Steve Benjamin are entirely serious. When lifelong learning proponents specify why it is that we must keep learning throughout our lives, they often focus on the need for the capabilities collectively known as higher-order thinking skills.

These are the skills that go beyond the "three R's" and rote learning to complex operations such as critical thinking, creative thinking, problem solving, and decision making—capabilities such as planning, reflection, gathering and using evidence, analysis, synthesis, evaluation, fluency (generating many ideas), flexibility (taking different perspectives), originality, elaboration, observation, exploration, classification, generating hypotheses, integration, making comparisons, and transferring skills and knowledge among domains. Some of the learning strategies addressed earlier in this summary involve the use of higher-order thinking skills.

Guidelines for teaching higher-order thinking skills >

Having determined that gaining facility in the use of these skills enhances achievement, attitudes, and readiness for lifelong learning, researchers and other scholars[14] offer the following recommendations for developing these skills in students:

[14]Findings and suggestions about higher-order thinking skills are drawn from Bazeli (1990); Benjamin (1989); Brophy (1987); Candy (1990); Cotton (1993, 1991); Hudgins and Edelman (1988); Imel (1994); and Ruddel (1995).

Establish a *supportive classroom climate* in which students feel free to experiment with new and more complex ways of dealing with information. Guidelines for creating such a climate include the following:

< Supportive classroom environments

- Set ground rules for discussions.
- Provide well-planned activities.
- Show respect for each student and communicate that individual differences are expected and appropriate.
- Provide nonthreatenting activities.
- Model flexibility.
- Exhibit a positive attitude.
- Acknowledge every response.
- Allow students to be active participants.
- Use a wide range of teaching modalities (addressed in section on learning styles, below).

Effective approaches for teaching higher-order thinking skills include the following:

< Teaching strategies

- Teach higher-order thinking skills in the context of teaching subject-area learning content.
- Emphasize activation and use of students' prior beliefs, knowledge, and experiences during classroom discussions.
- Conduct "inquiry" sessions, in which students are given a discrepant event and must devise questioning strategies that will lead them to resolution of the discrepancy.
- Ask a high percentage of open-ended, thought-provoking questions.
- Allow generous amounts of "wait-time"—at least five seconds—after posing open-ended questions.
- When students are formulating responses, stay with them, redirecting, probing, and reinforcing their thinking as they elaborate their responses.
- Encourage interaction among students for addressing complex tasks; specific roles may be assigned, e.g., task definer, strategist, monitor, challenger, etc.
- Share authority in discussions to encourage involvement and

ownership of ideas.

- Encourage students to identify and critique the assumptions implicit in texts and other course materials.

Learning Styles

Most children can master the same content; how they master it is determined by their individual styles.

—Rita Dunn, Jeffrey S. Beaudry, and Angela Klavis, 1989

Properly speaking, learning styles are not learning skills; yet, awareness of learning styles is important both for teachers and for learners themselves. It is advantageous for both to be aware of the way the learner learns best and to seek learning activities that match his or her individual style.

The National Association of Secondary School Principals defines learning styles as

> characteristic cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how learners perceive, interact, and respond to the learning environment (quoted in Jordan 1993, p. 18).

Components of learning style >

Jordan goes on to say that learning style includes "such facets as perceptual modality preferences, preferences for cooperation versus competition and the myriad of personal desires related to the classroom environment" (p. 18). Her research summary on learning styles indicates that when teaching methods and materials are selected based on the student's learning style, higher test scores, improved attitudes, and improved discipline result.

Dunn, Beaudry, and Klavas (1989) confirm this finding and go on to say that

> Certain learning style characteristics are biological, whereas others are developed through experience. . . .Individual responses to sun, light, temperature, design, perception, intake, chronobiological highs and lows, mobility needs, and persistence appear to be biological; whereas sociological preferences, motivation, responsibility (conformity), and need for structure are thought to be developmental (p. 56).

Learning style, teaching style >

Research indicates that, when a learner can *initially* experience material that matches his or her dominant learning style—for example, a visual display for an individual who learns best this way—he or she becomes better able to learn in other ways subsequently, e.g., from text. Teachers are therefore encouraged to take note of the learning styles of their students and to use a variety of instructional media, especially when first introducing new concepts.

Dunn (1990) identifies research on the effectiveness of different instru-

ments for diagnosing learning style and recommends that teachers use one of these, rather than relying solely on their impressions of students' learning strengths and weaknesses. She also addresses questions regarding the use of diagnostic information for planning instruction.

Being knowledgeable about one's learning style is part of being a capable self-directed learner. Equipped with this self-knowledge, learners can make productive selections of everything from courses to take to supplementary materials to use to times of day to study.

The Teacher's Role

Good teaching should include not only teaching students how to learn, but also teaching them how to remember, how to think, and how to motivate themselves.

—Ann L. Loranger, 1994

The preceding sections include recommendations about the roles and functions of teachers who are working to educate and inspire lifelong learners. Teachers are encouraged to trust students, share authority with them, and engage them in activities to develop skills and dispositions for lifelong learning.

The following research-based recommendations summarize previous advice and incorporate some additional ideas:

< Summary of guidelines... with additions

- Reach agreement as a staff about learning skill terminology and approaches that will be used to teach and reinforce skills and strategies.

< Integrated staff approach

- Cultivate a sense of trust in students' ability and willingness to take much of the responsibility for their own learning.

< Trust

- Communicate high expectations for student learning and behavior.

< High expectations

- Establish supportive classroom environments in which students' experimentation with new ideas and skills are encouraged and respected.

< Supportive classrooms

- View yourself as a facilitator who guides and supports students in becoming independent learners.

< Teachers as facilitators

- Make use of research findings on effective practices for enhancing student learning motivation.

< Motivation

- Follow a sequence made up of instruction, modeling, guided practice, and independent practice with feedback to encourage internalization of learning skills.

< Validated practices

- Provide initial learning skill instruction within the context of subject-matter instruction; then work on transferring the skills to other domains.

< Learning skills and subject matter

- Be aware of students' individual learning styles and attempt to provide activities that are responsive to different styles.
- Create opportunities for students to learn together in pairs and groups; require individual accountability and provide group rewards.
- Emphasize rote learning where appropriate—for mastering multiplication tables or learning a few key historical dates, for example—but focus mostly on activities calling for more complex thinking skills.
- As language facility is fundamental to lifelong learning, develop language-rich environments which include plenty of opportunity for practicing reading, writing, speaking, and listening skills; offer students choices of reading materials and writing topics.

Focus on thinking skills >

Language-rich environments >

How do teachers adopt these roles and gain these skills? Research tells us that, in order to prepare autonomous, self-directed learners, teachers themselves need to have considerable autonomy, and they need to be curious, active, self-directed learners in their own right. They need to be able to structure their learning environments and use instructional methods and materials of their own choosing.

Teachers as autonomous lifelong learners >

The current trend toward school site-based management has moved decisions about these matters closer to classroom teachers; this, together with support from building administrators, has great potential for increasing teachers' ability to foster the attributes of lifelong learners.

The Family

What can families do to increase the likelihood that their children will become lifelong learners? Research on the effects of parental behaviors[15] tells us that children are more likely to be enthusiastic about learning if their parents are *mastery oriented* (placing value on effort and taking on challenges) than if they are *performance oriented* (believing success to be the result of native ability and interested in normative feedback).

Focus on *mastery*, not competition >

"An emphasis on ability and normative standards and an avoidance of challenge are likely to foster an extrinsic focus, a competitive orientation, or even a sense of helplessness for children who do not do well," write Ames and Archer (1987, p. 413).

The evidence is beyond dispute: parent involvement improves children's attitudes toward learning and helps to motivate the children to be successful in school.

—Raymond J. Wlodkowski, 1991

[15]Parental behaviors recommended for encouraging lifelong learning are from the work of Ames and Archer (1987); Diez and Moon (1990); Judge (1995); Katz (1988); Mathews, Flum, and Whitney (1990); Ramey and Ramey (1994); Stipek, et al. (1995); and Wlodkowski (1991).

In addition to a mastery orientation, other family attitudes and behaviors shown by research to correlate positively with children's long-term learning motivation include:

< Helpful family attitudes and behaviors

- A feeling of having control over their lives
- A view of hard work as a key to success
- High expectations for their children's learning and behavior
- A view of the family as a mutual support system
- Frequent contact with teachers
- Expressing and modeling a love of reading by using the local library, having plenty of reading materials in the home, and frequently engaging in reading
- Encouraging children to explore their interests
- Providing appropriate surroundings for studying at home and helping children to develop appropriate study habits
- Communicating about learning and conducting in-home learning activities
- Supporting a developmentally appropriate, socially oriented learning program for small children, rather than an academically oriented one (see the section on motivation and persistence)

Much more information about things parents and guardians can do to help their children become lifelong learners may be found in the other booklets in this series. See page iv.

< See booklets for parents and students

In Conclusion

Dahlberg writes, "Preparing students for life and work in the information age is an opportunity to raise literacy and learning to unprecedented levels. It is a chance to enable all students to become competent thinkers and lifelong learners" (1990, p. 17).

Legislators, educators, parents, and others concerned about students' preparedness for tomorrow can make best use of this opportunity by applying the findings and guidelines emerging from the research on lifelong learning.

Key References

*Brophy, J. "Synthesis of Research on Strategies for Motivating Students to Learn." *Educational Leadership* 45/2 (October 1987): 40-48.

Discusses the nature of academic motivation and presents research-based strategies, organized within several main categories, that teachers can use to enhance students' motivation to learn—both in general and with regard to specific tasks.

Caissy, G. "Developing Curriculum for the Information Age: How Must Education Change to Meet Future Needs?" *Education Canada* 26/2 (Summer 1986): 21-25.

Identifies changes brought about by the advent of high technology and the growing percentage of jobs that are information related. Specifies the skill needs of contemporary students and the curricular changes that will be called for to enable them to develop needed skills.

Candy, P. C. "How People Learn to Learn." In *Learning to Learn Across the Life Span*, edited by R. M. Smith. San Francisco: Jossey-Bass Publishers, 1990, 30-63.

Describes how the learning-to-learn process takes place and the skills it encompasses. Cites some of the curricular approaches that people have developed to enhance learning competence. Stresses the perspective of the learner in determining what is learned.

*Cochrane, D. J. "Lifelong Learning." In *National Business Education Yearbook—1992*. Reston, VA: National Business Education Association, 1992, 115-126.

Discusses the workplace developments that have increased the need for workers to become lifelong learners and identifies the skills needed for lifelong learning in business environments—problem-solving and decision-making skills, creative and critical-thinking skills, team-building skills, and learning-how-to-learn skills. Also identifies teachers' roles and enumerates the benefits of lifelong learning.

*Cotton, K. *Developing Employability Skills*. Close-Up #15. Portland, OR: Northwest Regional Educational Laboratory, November 1993.

Summarizes research designed to determine what practices are most effective in equipping young people with employability skills, defined as the basic skills, higher-order skills, and affective skills and traits necessary for success in the workplace. Findings include that these skills should be explicitly taught and that classroom environments should replicate key features of work settings.

Asterisk (*) indicates recommendations for basic background reading.

*Cotton, K. *Fostering Intercultural Harmony in Schools: Research Findings*. Topical Synthesis #7. Portland, OR: Northwest Regional Educational Laboratory, November 1993.

Reviews research literature and identifies practices which research has shown to be effective in reducing negative intergroup attitudes and behavior and encouraging positive intergroup relations. Key practices include multicultural education, cooperative learning, prejudice-reduction and empathy-development activities, critical thinking, and activities to increase student self-esteem.

Cotton, K. *Teaching Composition: Research on Effective Practices*. Topical Synthesis #2. Portland, OR: Northwest Regional Educational Laboratory, February 1988.

Synthesizes research on effective instructional practices for developing writing skills. Findings support a "process approach," in which students engage in prewriting activities, drafting, revising, editing, and publication of materials, with opportunities to receive and use feedback between steps of the process.

Dahlberg, L. S. "Teaching for the Information Age." *Journal of Reading* 34/1 (September 1990): 12-18.

Argues that literacy and learning skills are the chief skill needs of students in an information age and notes that the majority of tasks today's students will face require problem-solving skills. Contrasts the approaches of expert and novice problem solvers, identifies problem-solving strategies, argues that students learn strategies best when they can apply them to tasks of personal relevance to them, and identifies problem solving as a means to facilitate lifelong learning.

Dickinson, L. "Autonomy and Motivation: A Literature Review." *System* 23/2 (May 1995): 165-174.

Drawing upon the literature on learner autonomy, motivation, and attribution theory, demonstrates that motivation and success are enhanced when learners take responsibility for their own learning, are able to control it, and perceive that their learning successes or failures are the result of their own efforts and strategies.

*Fielding, L. G., and Pearson, P. D. "Reading Comprehension: What Works." *Educational Leadership* 51/5 (February 1994): 62-68.

Summarizes research on effective practices for fostering reading comprehension and discusses ways that these findings can be implemented in the classroom. Plenty of time to read, instruction in comprehension strategies, collaborative learning, and sharing responses to reading material are research-supported practices.

Garcia, J.; Powell, R.; and Sanchez, T. *Multicultural Textbooks: How to Use Them More*

Effectively in the Classroom. Paper presented at the Annual Meeting of the American Educational Research Association, Boston, MA, April 1990 (ED 320 262).

Reviews research on the effects of using multicultural curriculum materials on students' levels of racial and ethnic bias. Presents the results of a study confirming previous findings about the potential of multicultural materials for increasing knowledge and changing attitudes.

*Hancock, V. E. *Information Literacy for Lifelong Learning*. ERIC Digest. Syracuse, NY: ERIC Clearinghouse on Information Resources, May 1993 (ED 358 870).

Discusses the concept of information literacy—what it is, why today's students need it, and how educators can best impart it to them. Defines information literacy as an individual's ability to recognize the need for information, identify and locate appropriate information sources, know how to gain access to the information contained in those sources, evaluate the quality of information obtained, organize it, and use it effectively.

Hattie, J.; Biggs, J.; and Purdie, N. "Effects of Learning Skills Interventions on Student Learning: A Meta-Analysis." *Review of Educational Research* 66/2 (Summer 1996): 99-136.

Reports the procedures and results of a meta-analysis of 270 effect sizes in 51 studies of the effects of instruction in learning skills with students of all ages. Key findings include that instruction in simple mnemonic devices is effective for rote learning; but for understanding and transfer of learning, study skills training should take place within the teaching of content rather than as an "all-purpose package of portable skills."

Hoff, L. R. "From Omnipotent Teacher-in-Charge to Co-Conspirator in the Classroom: Developing Lifelong Readers and Writers." *English Journal* 83/6 (October 1994): 42-50.

Describes the experience of a teacher who used research and professional development workshop content to restructure her approach to secondary reading and writing instruction. A classroom environment conducive to reading, student choice, plenty of in-class time to read and write, and student self-assessment were key features that improved student performance and attitudes toward language arts.

Hootstein, E. W. "Enhancing Student Motivation: Make Learning Interesting and Relevant." *Education* 114 (Spring 1994): 475-479.

Recommends four research-based approaches that can be used to stimulate student motivation to learn by developing learning activities that relate to students' inter-

ests and their experiences outside of school. Thought-provoking questions, challenging tasks, extending to students more control over their learning, and offering activities that respond to students' interests can all increase learning motivation.

Jordan, L. E. *A Study of Learning Styles: The Importance of Individual Learning Preferences, the Procedures To Accommodate Those Preferences in the Classroom, and How Human Development Research Has Impact on the Process.* Nashville, TN: Davidson County School District, 1993 (ED 381 440).

Reviews research on learning styles and discusses how findings can be used to modify instructional methods so as to meet the needs of individual learners. Discusses the problems involved in attempting to teach to individual learning styles and the benefits to be derived from doing so.

*Katz, L. "The Disposition to Learn." *Principal* 67/5 (May 1988): 14-17.

Cites research and offers research-based guidelines for enhancing young children's disposition to learn. Some key points: academic learning should not be required of those younger than first grade, reinforcement should be informative and used sparingly, and the attention of primary-age students should be focused on effort rather than ability.

Knowles, M. S. "Fostering Competence in Self-Directed Learning." In *Learning to Learn Across the Life Span*, edited by R. M. Smith. San Francisco: Jossey-Bass Publishers, 1990, 123-136.

Identifies the knowledge and skills necessary for self-directed learning and identifies ways to acquire this knowledge and skills. Argues that "the single most important competence that people must possess to survive is the ability to learn."

Owens, T. R., and Wang, C. *Community-Based Learning: A Foundation for Meaningful Educational Reform.* Topical Synthesis #8. Portland, OR: Northwest Regional Educational Laboratory, January 1996.

Summarizes research on community-based learning and discusses ways that this approach can contribute to educational reform. Discusses the effectiveness of community-based learning programs in equipping young people for the modern workplace and for meaningful participation in their communities. Offers recommendations to educators and policy makers.

Pate, G. S. "Research on Reducing Prejudice." *Social Education* 52/4 (1988): 287-289.

Cites findings from research on different approaches that have been undertaken to reduce racial, ethnic, and religious prejudice. Engaging in dramatic presentations, cooperative learning, critical thinking, and self-esteem-building activities are iden-

tified as particularly effective in reducing levels of prejudice within and outside of school settings.

*Rafoth, M. A., and DeFabo, L. *Study Skills: What Research Says to the Teacher.* Washington, DC: National Education Association, 1990 (ED 323 184).

Cites research support for the teachability of study skills and the improvement of student performance as a result of such teaching. Presents a model of the way information is processed in the brain. Identifies and gives examples of effective study skills. Identifies both general strategies and specific programs for fostering the development of study skills.

Ramey, S. L., and Ramey, C. T. "The Transition to School: Why the First Few Years Matter for a Lifetime." *Phi Delta Kappan* 76/3 (November 1994): 194-198.

Discusses the transition to school and academic learning, presents indicators of successful transitions to school, and identifies the features of learning environments that can give children lifelong positive attitudes toward learning. Calls special attention to the need for schools to respond to the cultural and economic diversity of the populations they serve.

Rauch, S. J. "How to Create a Lifelong Love of Reading." *The School Administrator* 49/5 (May 1992): 27-29.

Identifies reading program components that correlate positively with ongoing interest in reading, and provides guidelines for evaluation designs that can detect the presence or absence of these elements. Presents a checklist for use in classroom observations of teaching and learning in reading.

*"Reach Every Student." *Learning* 23/4 (January/February 1995): 53-56.

Discusses the major learning styles and provides initial suggestions for appropriate ways to teach children exhibiting these different styles. Provides a sample lesson, software programs suitable for different kinds of learners, and contact information for teachers with experience in teaching to different learning styles.

Ridley, D. S.; McCombs, B.; and Taylor, K. "Walking the Talk: Fostering Self-Regulated Learning in the Classroom." *Middle School Journal* 26/2 (November 1994): 52-57.

Defines self-regulated learning, discusses strategies teachers at all levels can use to foster it in classrooms, enumerates benefits to teachers and students of encouraging self-regulated learning, and identifies the perils of allowing students to be too teacher dependent. Offers recommendations to teachers and administrators.

Scott, J. E. "Self-Efficacy: A Key to Literacy Learning." *Reading Horizons* 36/3

(January/February 1996): 195-213.

Defines self-efficacy, shares research findings about the effects of a sense of self-efficacy on student motivation and performance, and identifies ways that teachers can foster the development of self-efficacy in their students. Teacher self-efficacy is also discussed and the behaviors of teachers with a strong sense of self-efficacy are identified.

Slavin, R. E. "Cooperative Learning: Applying Contact Theory in Desegregated Schools." *Journal of Social Issues* 41/3 (1985): 45-62.

Reviews research on the effects of cooperative learning on cross-racial friendships and discusses findings in relation to Gordon Allport's "contact theory," a set of principles specifying conditions under which interracial contact leads to improved relationships.

*Smith, R. M., and Associates. *Learning to Learn Across the Life Span*. San Francisco: Jossey-Bass Publishers, 1990.

Argues that the lifelong learning needs of contemporary citizens require skill development in learning to learn. Presents research-based approaches for improving learning-to-learn skills from early childhood into adulthood.

Thomas, J. W.; Strage, A.; and Curley, R. "Improving Students' Self-directed Learning: Issues and Guidelines." *The Elementary School Journal* 88/3 (January 1988): 313-326.

Discusses the importance of building students' self-directed learning skills and identifies research-supported practices for enhancing these skills. Beneficial practices are cited, organized within the categories of (1) academic demands, (2) instructional supports, (3) opportunities to learn and practice self-directed learning activities, and (4) goal structure.

Wlodkowski, R. J. "Developing Motivation for Lifelong Learning." *In Context* 27 (Winter 1991): 40-42.

Identifies the components and sources of learning motivation and offers research-based guidelines that individuals and institutions can use to enhance the learning motivation of children and adults.

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Crowell, S. "A New Way of Thinking: The Challenge of the Future." *Educational Leadership* 47/1 (September 1989): 60-63.

Cummings, H. E. "Orienting the Curriculum to Future Workforce Needs." *The Technology Teacher* 51/8 (May/June 1992): 9-11.

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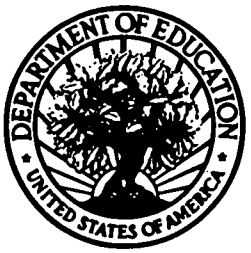

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