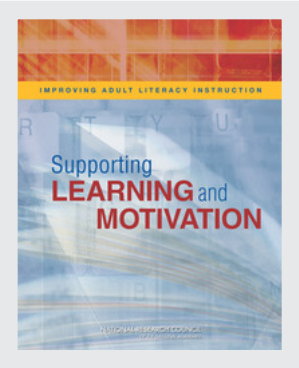

Improving Adult Literacy Instruction: Supporting Learning and Motivation (2012)

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IMPROVING ADULT LITERACY INSTRUCTION

Supporting LEARNING and MOTIVATION

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

CONTENTS

Improving Adult Literacy Instruction

Supporting Learning and Motivation

irtually everyone needs a high level of literacy in both print and digital media to negotiate most aspects of 21st century life—succeeding in a competitive job market, supporting a family, navigating health information, and participating in civic activities. Yet according to a recent survey estimate, more than 90 million adults in the United States lack the literacy skills needed for fully productive and secure lives.

At the request of the U.S. Department of Education, the National Research Council convened a committee of experts from many disciplines to synthesize research on literacy and learning in order to improve instruction for those served in adult education in the U.S. The committee's report, *Improving Adult Literacy Instruction: Options for Practice and Research*, recommends a program of research and innovation to gain a better understanding of adult literacy learners, improve instruction, and create the supports adults need for learning and achievement.

This booklet, which is based on the report, describes principles of effective instruction to guide those who design and administer adult literacy programs and courses. It also explores ways to motivate learners to persist in their studies, which is crucial given the thousands of hours of study and practice required to become proficient. The booklet concludes with a look at technologies that show promise for supporting individual learners and freeing busy adults from having to be in a particular place in order to practice their literacy skills. Although this booklet is not intended as a "how to" manual for instructors, teachers may also find the information presented here to be helpful as they plan and deliver instruction.

The principles and practices described in this booklet reflect the best available research on learning and motivation, and they should be applied now in developing instruction

for adults. However, it is important to keep in mind that these principles and practices are derived mainly from research with K-12 students and general research on how people learn. So far, little research has been conducted to determine how best to incorporate this knowledge into more effective literacy instruction for adults.

The approaches explained here need to be modified to account for adults' unique needs and learning goals. Precisely what needs to be taught and how will vary depending on the individual's existing literacy skills, learning goals, age, motivation, and cultural and linguistic background.

As the report explains in detail, far more research is needed to determine how best to adapt the guiding principles and practices to meet the needs of adult learners. Those who develop, administer, and fund adult literacy instruction, those who prepare instructors, and teachers themselves will have important roles to play in these research studies as they work to help all adults meet modern literacy demands.

Principles of Learning for Instructional Design

he ideal culmination of successful learning, including literacy learning, is the development of expertise. The expert learner forms conceptually rich and organized representations of knowledge that resist forgetting, can be retrieved automatically, and can be applied flexibly across tasks and situations.

For example, in order to comprehend a text, the expert reader must be able to decode words fluently and automatically so that attention can be given to understanding and remembering the text. Expert readers also use their knowledge of the topic, sentence structure, and genre to make sense of a given text. In addition, they monitor whether they are comprehending the text and select appropriate strategies—for example, rereading specific sections or mentally summarizing or elaborating main ideas—and adapt the strategies as needed to improve their understanding and recall of the text.

Expertise is usually difficult to achieve—experts tend to have 1,000 to 10,000 hours of experience in a given area—and for a complex skill such as literacy, expertise requires many hours of practice over many years. With respect to literacy expertise taught in schools, an hour per day from kindergarten through twelfth grade amounts to about 2,000 hours in total, which is at the low end of the range needed to gain expertise. Adult literacy learners can be assumed to have missed out on many of these hours and to need substantial additional practice.

Given the hours of practice needed to develop literacy skills and the competing demands in adults' lives, instruction should be designed to proceed as efficiently as possible. This section will explore general principles of learning that can guide the design of literacy instruction for adults.

Helping Learners Acquire, Retain, and Transfer New Knowledge and Skills

A number of approaches can help learners retain what they learn and transfer it to new situations. For those who teach adults with low literacy skills, following these guidelines is especially important for ensuring that new concepts are absorbed.

Choose the appropriate level of difficulty. Selection of learning goals, materials, and tasks should be sensitive to what the student has mastered and be appropriately challenging—not too easy or too difficult, but just right. Consider a text used to help adults learn about a medical procedure: If the text is extremely easy and overlaps perfectly with what the learners already know, then it will not stretch their knowledge beyond what they already knew without it. Neither will the adults gain much medical knowledge if the text is too complex and riddled with technical jargon beyond their understanding. Developing readers need to confront challenging texts that engage them with new and meaningful content, but they also need texts that allow them to practice and further develop the skills they have already begun to acquire.

Present material in a clear and organized format. Adults of all ages benefit from a clear and organized presentation that helps them remember new information. It is important to remove any irrelevant information, even if it is interesting, that could

compete for the learner's attention and detract from learning. Visual displays that are hard to read or spoken presentations given in noisy environments can compromise learning because they draw attention away from deeper processing of meaning.

Providing structure and organization is important to help learners understand concepts and how they relate to each other. The format used depends on the relationships that will be depicted; outlines can be used to show structural hierarchies, and tables can organize ideas in two or three dimensions, while diagrams can help convey more complex relationships among ideas. Materials and lesson plans also should be organized so that related elements and ideas are presented near each other in space and time. For example, an explanation should be given at the time a concept is depicted rather than many minutes, hours, or days later. In addition, new material should be presented in discrete units so that new learners are not overwhelmed with too much new information at once.

Use multiple and varied examples and formats. If knowledge, skills, and strategies are acquired in multiple and varied contexts, learners can better apply the knowledge across a range of tasks and situations. Memories can be triggered by multiple cues, so that knowledge is available when needed. Learners may acquire knowledge more slowly this way, but retain and transfer it better than if they had learned it in only one context. For example, effective vocabulary instruction focuses on teaching the multiple meanings of words and the varied forms they take; it also provides ample opportunities to encounter and use words in many different contexts.

However, implementing this principle must be balanced against the preceding principle: The amount of information should not overwhelm the learner to the point of attention being split or cognitive capacities being overloaded.

Space presentations of new material across time. It is better to distribute the presentation of materials and tests over time than to concentrate the learning experiences within a short time span. For example, when studying new vocabulary words, it is better to space the same amount of study over days or weeks—and to use the words in varied contexts such as reading, speaking, and writing—than to cram it into a single study session. Re-exposure to course material after a delay often markedly increases the amount of information that a student remembers.

Test on multiple occasions, preferably with spacing. There is substantial evidence that periodic testing helps learning and slows down forgetting. Regular quizzes, which can be quite brief and embedded in instructional materials, keep students constantly

engaged. Quiz results can guide instructors (or computers) in making decisions about what to teach. Students benefit more from repeated testing when they expect to need to use the tested knowledge or remember it for some reason—for example, for a final exam. Spacing tasks that make students retrieve information, such as tests, over time has been shown to improve learning for adults from a wide age range.

Ground concepts in concrete experiences. It is important to link concepts that learners read or learn about to concrete perceptions and actions. For example, while reading instructions on assembling a piece of furniture, it helps to be able to view and hold the parts to which the instructions refer.

New knowledge is built on existing knowledge and interpreted in light of it, and much existing knowledge comes from everyday activities. Stories are usually about everyday experiences and create memories similar to daily experience, and stories are easier to read, comprehend, and remember than other types of learning materials. As a result, they may be powerful tools for building and practicing comprehension skills and developing and reinforcing background knowledge across the lifespan.

At the same time, genres other than narratives tend to be underused in literacy instruction, and literacy does require the ability to handle a variety of texts; students will need to practice these other forms as well.

Supporting Learners in Generating Content and Reasoning

Many adult learners are simultaneously learning to read and reading to learn. They need both to develop comprehension skills and engage deeply with subject-matter content.

Learners should not simply be passive processors of material delivered to them; they should think actively about what they read and also generate their own language (both spoken and written), reasoning, and content. Learning of subject matter is enhanced when learners have to organize the information themselves and exert cognitive effort to acquire or retrieve it.

Simply put, it is the student who should be doing the acting, thinking, talking, reading, and writing in order to learn. Encouraging learners to engage in deeper levels of thinking and reasoning is especially helpful to adults, who need to develop these skills for education, work, and other purposes involving complex materials and tasks.

Encourage the learner to generate content. Learning is enhanced when learners produce answers themselves instead of reading or recognizing them—a fact that explains why free-recall or essay tests often help students retain information better than recognition or multiple-choice tests. However, learner-generated content can lack detail and contain misconceptions; instructors should monitor the content to ensure that students are learning enough and that they avoid learning incorrect information.

Strategies that require learners to be actively engaged with reading material also produce better comprehension and retention over the long term. For example, learners can develop their own mini-testing situations as they review material, such as stating the information in their own words without viewing the text, and synthesizing information from multiple sources, such as from class and textbooks. Research shows that reading comprehension also improves with frequent writing.

Adults from a wide age range can benefit from generating content to improve learning. Past their 20s, however, learners may slowly become less likely to spontaneously generate content that is rich, elaborative, and distinctive if they are learning in a field outside their previous knowledge and experience; these learners may need more support.

Encourage learners to generate explanations and resolve contradictions. Learning is facilitated when students need to construct explanations and arguments. Offering explanations—for example, the cause of an event, the rationale for an action, or the logic underlying a claim—helps students bring coherence to the material they read, whether fiction or nonfiction, and understand why what they are reading is relevant and important. Students may be prompted to give their own explanations of the material by thinking aloud, or by answering questions that elicit explanations connecting the material to what they already know.

Explanations of material and reasoning are elicited by deep questions—such as why, how, what-if, and what-if not—as opposed to shallow questions that require the learner to simply fill in missing words, such as who, what, where, and when. Training students to ask deep questions aids their comprehension of material from electronic media, extended texts, and classroom lectures.

One method of stimulating thought and reasoning is to present some challenges, contradictions, equally attractive alternatives, or other types of impasses that place the learner in "cognitive disequilibrium." When these impasses occur, adaptive learners engage in reasoning, problem solving, and planning on their way to restoring cognitive equilibrium. Presenting a challenging problem before students read a text can stimulate inquiry, curiosity, thinking, and deeper learning as they work to comprehend the text.

Encourage the learner to construct ideas from multiple points of view and different perspectives. This approach can help learners develop greater understanding and cognitive flexibility in using a concept in a range of contexts. If a concept is understood in only a specific and rigid manner, it will be encoded, accessed, and used in a restricted way. When interventions help learners interconnect facts, rules, skills, procedures, plans, and deep conceptual principles, their cognitive flexibility increases, and they are more able to transfer knowledge and skills to other complex tasks.

For example, before reading a story, learners can be instructed to adopt the perspectives of different characters; as a result, their recollections and interpretations of the story afterward end up being quite different. Readers eventually can be trained to adopt multiple character viewpoints while reading stories and thereby achieve greater cognitive flexibility.

Developing Metacognition and Self-Directed Learning

Learners who achieve expertise tend to be self-regulated: they formulate learning goals, track progress on these goals, identify gaps in their own knowledge, and search relevant information sources for answers; their "meta" knowledge of how and when to employ learning strategies is well developed. However, both children and adults can experience serious limitations in their meta-awareness. The vast majority of adults are not good at judging their own comprehension of text, for example. Therefore, explicit training, modeling, and guided practice are needed to help adult learners become more self-directed.

Structure instruction to develop effective use of complex learning strategies. Students can acquire complex learning strategies through instruction that is structured, explicit, intensive, and "scaffolded." Scaffolding means sequencing and structuring the content and tasks to be learned and providing the prompts that help a learner to develop a new skill. The instruction typically goes from simple to complex, with substantial practice at each step. Supports for learning are gradually phased out as learners develop new skills and become able to complete tasks on their own.

For example, students might learn to solve mathematical problems by observing experts solve example problems step-by-step, or by alternating study of worked-example solutions with practice solving similar problems. Students learn more through these approaches than by simply attempting to solve problems on their own. As another example, a literacy instructor might model use of reading comprehension strategies by thinking aloud as he chooses and implements a particular strategy, decides whether it is working, and adjusts it accordingly. After watching and listening as the instructor models this process, students can practice choosing and implementing strategies on their own, with help from the instructor as needed.

Combine instruction in complex learning strategies with learning of content. Strategy instruction should be deeply integrated with subject-matter content rather than being lists of abstract rules or scripted procedures that ignore the content. For example, it is a good strategy for readers to be asking the question "why" when reading texts because it encourages the student to build explanations of the content. This strategy is ideally implemented across the curriculum, so that students ask questions such as why catalysts are important when reading a chemistry text, why the Spanish-American War was important in U.S. history, why a character in a novel acts in a particular way, and why an author bothers to describe the layout of a city.

Providing Feedback

Feedback helps learners fine-tune their knowledge, skills, and strategies, affecting learning in a number of ways that are well documented. It can be explicitly delivered by people or computers, or it can be implicitly provided in unsupervised situations that are engineered to make knowledge and skill gaps evident to the learner.

Accurate and timely feedback helps learning. Learners benefit from instructional interactions in which they receive fine-grained feedback—in other words, feedback detailed and specific to the task at hand—with hints that prompt them to generate information or execute a behavior or skill.

The optimal timing of the feedback depends on the task. Immediate feedback

has the advantage of helping students learn correct information instead of incorrect information. For example, when incorrect alternatives are presented on multiple-choice tests or in classroom discussion, it is possible for learners to remember the wrong answers instead of the correct ones. These effects can be reduced when learners receive feedback immediately after a test or while completing a task.

While immediate feedback can be useful under many conditions, it does have potential liabilities. A learner's motivation can be threatened by a barrage of corrections and negative feedback. Frequent interruptions of organized sequences of action while performing a complex task, such as reading a text aloud, can irritate learners and slow their learning. Feedback offered too soon also can prevent students from correcting their own reading errors and regulating their own learning.

Administering feedback in the optimal way is complex; it depends on timing, the nature of the knowledge or skill to be developed, and characteristics of the student. It is unlikely that an instructor can track all of these factors for 30 students in a class, and it can be challenging for a tutor to track them even for a single student. As discussed later in this booklet, technologies can keep track of details that are beyond human capacities. Computerized learning environments are poised to provide adaptive feedback that is sensitive to all of these constraints.

Qualitative feedback is better for learning than test scores and error flagging. Feedback should explain what's good about the student's performance, point out errors to the learner, and explain why the information is incorrect, rather than merely flagging errors or providing an overall score that does not offer information about needed improvements. Much of this research is on learning subject-matter content rather than literacy per se, but the principles are expected to apply universally.

Also, adult learners with high levels of perceived control—in other words, those who feel they have the power to influence outcomes—may benefit more from feedback than those with lower levels of perceived control.

Using Adaptive, Interactive Learning Environments

Training in complex strategies, metacognition, and self-regulated learning may to some extent be accomplished by well-engineered training materials that guide all learners through the same regimen in a scripted fashion. However, students often need to be guided by knowledgeable tutors, mentors, and computer learning environments that adaptively interact in a way that is sensitive to the characteristics of the individual learner, especially as they encounter complex material.

Indeed, research has shown learning gains through intelligent tutoring systems and other reading systems—involving either computer systems or human tutors—that adapt to the learner. Computer environments have promise because of the complexity of assessing and teaching to the needs of individual learners.

Learning is enhanced by opportunities to practice and use skills for a purpose. Real-world learning is likely to motivate struggling adult learners who are sensitive to the value of their learning experience. And research on learning has shown that the likelihood of transferring a newly learned skill to a new task depends on the similarity between the new task and tasks used for learning. As a result, literacy instruction is most likely to lead to durable, transferable learning if it incorporates real-world activities, tools, and tasks. Still, much needs to be understood about how to design these experiences effectively in the context of literacy development, especially for adults.

Motivating Adult Learners to Persist

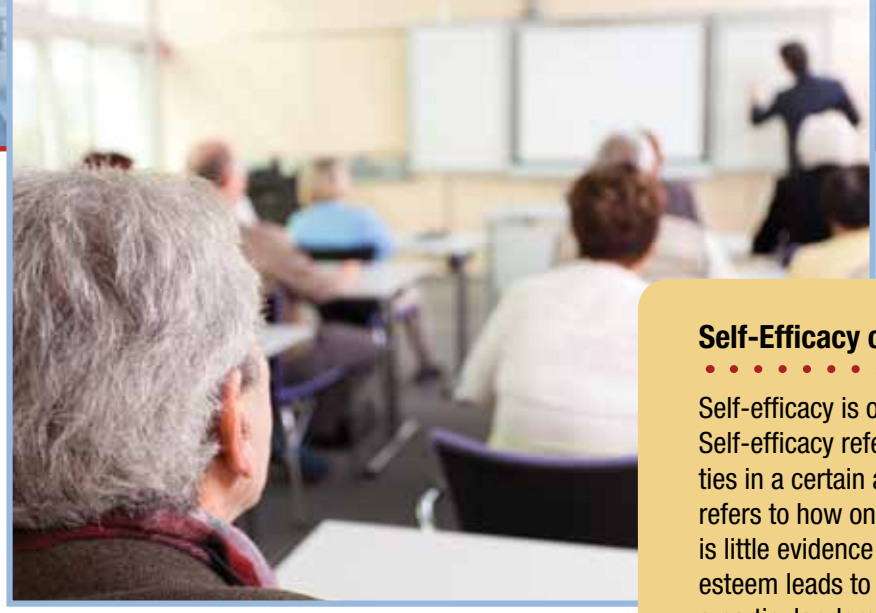
dults lead complex lives with limits on the amount of time they have to engage in formal learning. This reality, combined with the amount of effort and practice needed to develop one's literacy skills—generally many thousands of hours—makes supporting persistence one of the most challenging aspects of designing effective adult literacy instruction. The average adult learner's duration in a literacy program is nowhere close to the length of instruction and practice needed.

How can programs and instructors help motivate students to persist in their efforts? This section explores insights from research about how to shape learning environments—instructional interactions, structures, systems, tasks, and texts—in ways that encourage persistence.

Psychological studies have identified an impressive array of factors that contribute to individual motivation—including self-efficacy, self-control, goal orientations, and interest, among others. Although each of these factors is discussed separately below, it is important to keep in mind that they interact with one another in complex ways to influence a learner's motivation. For example, the goals people set are related to their self-efficacy—their perceived ability to perform well on a task—and the value they assign to the task.

Building Learners' Self-Efficacy

When learners expect to succeed, they are more likely to put forth the effort and the persistence needed to perform well. More-confident students are more likely to be more cognitively engaged in learning and thinking than students who doubt their capabilities. Indeed, self-efficacy is a strong predictor of many educational and health outcomes and has been associated with better literacy skills.



Self-Efficacy or Self-Esteem?

Self-efficacy is often confused with global self-esteem. Self-efficacy refers to learners' beliefs about their abilities in a certain area, such as literacy; global self-esteem refers to how one feels about oneself generally. While there is little evidence that enhancing students' general self-esteem leads to increases in achievement, self-efficacy in a particular domain—such as education or health—relates positively to outcomes in that domain.

It can be expected that some adults enter literacy education questioning their ability to learn to read and write. Moreover, beliefs about self-efficacy can decrease in middle age and older adulthood, although this tendency may vary among individuals. Such beliefs can be modified, however, through experience with tasks in which realistic goals are set and progress is monitored relative to those goals.

Setting Appropriate Goals

Goals are extremely important in motivating and directing behavior. Adults often have very general ideas about why they need or want to learn to read and write. To motivate persistence and success, instructors need to help learners break down their learning goals into short-term and long-term literacy goals. If learners set near-term goals, not just distant ones, they are much more likely to experience success, which enhances self-efficacy. Supporting learners' awareness of progress week-by-week can motivate persistence, as learners reach their near-term goals and recognize that these are the path to reaching long-term goals.

There are also different types of goals, the choice of which can influence learning outcomes:

- When a learner holds a **mastery goal,** he or she engages with a task in order to improve ability; the goal is to truly master the task. When students hold this type of goal, the point of comparison is the student him- or herself. That is, the student compares his or her present performance to past performance to gauge improvement.
- When a learner holds a **performance-approach goal**, the goal is to demonstrate his or her ability relative to others; the students compare their performance to that of other students, with the goal of demonstrating greater competence.

- When a learner holds a **performance-avoidance goal,** the student's goal is to avoid appearing incompetent or "dumb." Such students would want to avoid appearing to others that they have poor literacy skills.

Learning environments can be structured in ways that encourage learners to set different types of goals. If a teacher emphasizes the importance of mastering literacy skills, learners are likely to adopt mastery goals; if a teacher emphasizes relative ability (i.e., the teacher inadvertently makes comments that position adult learners as "good" or "bad" readers), learners are likely to adopt performance goals.

Adopting mastery goals predicts positive outcomes that include persisting at tasks, choosing to engage in similar activities in the future, and using effective cognitive and self-regulatory strategies. Performance-avoidance goals consistently predict negative outcomes, including increased use of self-handicapping strategies and poor achievement. Results for performance-approach goals are mixed, with some studies finding that they are related to positive outcomes and others finding the opposite.

In addition, learners can have certain beliefs about intelligence that can affect their self-efficacy and as a result their personal goals for learning. Students who hold an incremental view of intelligence believe that intelligence is malleable and that it is possible to learn just about anything. These students are likely to adopt mastery goals. In contrast, students who believe that intelligence is fixed so that a person cannot effectively learn more than they are naturally capable of learning are likely to adopt performance goals.

It appears possible, however, to alter beliefs about intelligence. For instance, feedback that focuses a learner's attention on how learning happens—for example, on the use of strategies, effort, practice, and the general changeable and controllable nature of learning—can foster more incremental views of ability with positive outcomes.

Offering Feedback in Ways that Motivate

Self-efficacy requires having fairly accurate perceptions of one's current competencies. Overestimating one's ability to read and understand a text, for instance, will not lead to engaging in the behaviors needed to develop new skills. Underestimating one's abilities may lead to coping or hiding behaviors that prevent the learner from making use of his or her existing skills.

To develop accurate perceptions of their competencies, students need to receive clear, specific, and accurate feedback. The feedback should be appropriate to the learners' needs and be specific about the area that should be improved.

Assist learners in managing errors. Students of all ages can find errors demotivating. Research suggests the benefits of error management—that is, leading adults to expect errors as a part of the learning process and then providing strategies for coping with errors and learning from them. Instructors need to know how to recognize and correct ingrained negative attributions by providing feedback that stresses the processes of learning, such as the importance of using strategies, monitoring one's own understanding, and engaging in sustained effort even in the face of challenges.

Reframe explanations in ways that motivate persistence. Experiences with learning can trigger questions such as: Why did I do badly? (after receiving a low score on an evaluation). Why can't I understand this? (after failing to comprehend a paragraph). Why can't I write sentences that make sense? (after being unable to write a coherent short story). The "attributions" students form in response to such questions—in other words, how they explain the reasons for their successes and failures to themselves—will either motivate them to persist or discourage them from doing so.

A learner who is experiencing difficulty comprehending a text, for example, will be more likely to persist if he or she attributes the difficulty to something external (for example, a boring text), something uncontrollable (being ill), or something unstable (feeling depressed that day). A learner who experiences success at a task will be more likely to persist if progress is attributed to something internal (for example, personal enjoyment of reading), controllable (practice, spending a lot of time working on the text), and stable (a belief in one's ability as a reader).

When a student does not experience success—for example, if he or she is unable to make sense of the overarching point of a short story—instructors can help the learner employ reading strategies that can elucidate the story's meaning and also provide a different frame for thinking about the reasons for the learner's difficulties and errors. With repeated reframing, instructors can help learners develop attributional styles that allow learners to employ strategies and skills that are more likely to lead them to persist.

Model literacy strategies. Vicarious experience—such as observing others successfully perform specific tasks or use specific strategies—is another way to frame learners' attitudes toward learning and increase self-efficacy. For instance, instructors or students might model literacy strategies or other learning behaviors.

Using Assessments Appropriately

While assessments are important, the ways in which they are administered and the feedback presented can affect learners' motivation in either positive or negative ways. Stressing the importance of assessments and tests can lead students to adopt performance goals—goals in which a student compares his or her progress to that of others. As discussed previously, these goals are related to some problematic academic outcomes, particularly when students are preoccupied with the goal of avoiding appearing incompetent. When students are focused on how they compare to others academically, they may use less-efficient cognitive strategies and engage in various self-handicapping behaviors.

To avoid demotivating students, instructors should:

- Present the results of assessments privately. Presenting assessment results in a public manner is conducive to students adopting performance rather than mastery goals.
- Encourage students to focus on effort and improvement whenever possible. Motivation is strengthened if students feel they can improve if they work hard at a task. Intrinsic motivation is enhanced when students are rewarded on the basis of their improvement rather than on absolute scores.
- Allow the student to take an assessment again if he or she does not receive an acceptable score.

Approaches to Avoid

Research suggests that teachers can contribute to learners' negative framing and explanations in a variety of ways, including by:

- Communicating, intentionally or unintentionally, to learners that a reading problem is internal to them. Teaching practices that could build negative internal attributions include labeling readers and writers as strong or struggling; making obvious assignments of readers and writers to working groups by skill level; and encouraging some learners to excel, while exhibiting low expectations for others.

- Providing inadequate or no feedback, which can signal that skills are inherent and immutable. For example, if a teacher responds to an answer with, "No, that is wrong—try again," and does not provide feedback or suggestions for development, then the student may develop or apply a maladaptive attribution (e.g., "I must not be very smart"): an internal, stable, and uncontrollable attribution for failure that is unlikely to enhance motivation to read.

Incentives and Motivation

Intrinsic motivation refers to undertaking a behavior for its own sake, because one enjoys it and is interested in it, with a high degree of perceived autonomy. Students who are more intrinsically motivated or perceive their behaviors as autonomous show better text recall and college course grades, among other positive outcomes. Intrinsic motivation is affected by whether rewards are given for performance, the degree to which the learner values the activity or task and is interested in it, and whether there are opportunities for choice about ways to participate in it.

There is debate about whether students' intrinsic motivation to perform a learning task is undermined if an external reward is offered (for example, if a student is paid for getting good grades). Some argue that extrinsic incentives do not harm students' intrinsic motivation, while others maintain that they ultimately lower it. The case against external rewards has been confirmed in a synthesis of 128 experiments. External rewards can lead to problem-solving that is more rigid, less flexible, and slower. Large financial incentives, in particular, can lead to lower performance. One possibility is that rewards thwart the person's sense of autonomy and control and thus their intrinsic motivation.

The conditions under which rewards or incentives affect adults' participation and persistence in literacy instruction are unknown, however. State and federally funded adult literacy programs at times offer incentives for enrollment. For example, many adult education courses, which include various courses in literacy, are provided free of charge in the city of Philadelphia. In this case, the "incentive" is an opportunity that makes it possible for adults to enroll in the courses; the payment is provided prior to enrollment, enabling adults who might not be able to afford the class otherwise to enroll. When these "opportunity enhancers"—such as support for child care, coverage of costs of enrollment, or replacement of lost wages—are used up front to minimize barriers to participation, they may not have the negative impact documented for simple external rewards.

By contrast, other programs provide incentives upon completion of programs or during participation. In some instances such systems may have positive effects. For example, the state of Tennessee recently implemented a program in which students received cash incentives for participating in adult education classes; the results of a nonexperimental study suggested that the introduction of rewards was related to achievement and to passing the GED examination among welfare recipients.

If external incentives are offered, it is important to implement them in a way that does not diminish intrinsic motivation. External rewards should be presented so that students perceive them as providing information about their progress rather than as controlling their behavior. Also, the reward should be contingent on the student's having learned specific literacy skills or reached a goal, rather than for simply engaging with or completing a literacy task or course. For instance, if the reward provided by an adult education course is a job referral, then the job referral should be offered for having learned specific skills—such as being able to write a coherent essay—and not for merely having completed a set of tasks, such as completing all course exercises. In this case, the learner's intrinsic motivation is less likely to be undermined because he or she is likely to see the reward as a natural consequence of having learned specific skills.

The impact of various types of incentives on persistence in adult literacy instruction is a complex issue, and further research is warranted to determine the particular circumstances under which some types of incentives might motivate certain learners.

Providing Choice and Autonomy

When learners believe that they have some control over their own learning, they are more likely to take on challenges and to persist with difficult tasks, compared with students who perceive that they have little control over their learning outcomes. A con-

trolling or pressured climate in a classroom, home, or work group is known to decrease motivation to perform a variety of behaviors.

Providing people with choice about what activities to do and how to do them can increase intrinsic motivation, provided that the number of options offered is not overwhelming. Experiencing higher levels of perceived self-control predicts numerous positive outcomes, among them engagement in school and academic achievement. The amount of autonomy a learner desires, however, appears to depend on how competent and self-efficacious he or she feels. If the task is new or especially challenging, an individual may appreciate having little autonomy.

Building a sense of learner autonomy and control does not mean abandoning adults to learn on their own; there are a number of ways that instructors can give their students autonomy without sacrificing best practices such as providing specific feedback, offering explicit and clear modeling of strategies, and monitoring progress, all of which develop proficiencies and so support greater autonomy.

The choices allowed can be quite small and still have important effects on motivation. For example, instructors can encourage adult learners to choose whether they want to work on a reading passage individually or in small groups, choose the order of activities during a class session, or choose the genre of the next text they will read.

Providing a rationale for a task or behavior also can support perceived autonomy. For instance, one study found that providing a meaningful rationale for doing an uninteresting activity, acknowledging that participants might not want to do the activity, and minimizing the use of controlling language led to increased reports of autonomy.

Values

A person may persist with a task that is not initially intrinsically interesting if it is valued. Value refers to learners' beliefs about whether a domain or task is enjoyable (intrinsically interesting), useful, important to identity or sense of self, and worth investing time in.

These dimensions work together; a less-than-skilled reader may nevertheless approach a difficult reading task with strong motivation to persist if the task is interesting, useful, or important to his or her identity. One study, for example, illustrated the value that adolescent readers attached to various texts because those texts taught them important life lessons or provided information necessary for fitting in with a group or social network.

Although valuing an activity is important for learning in the context of compulsory education, it is vital for persistence in adult literacy education. If adult learners develop and maintain positive values about the literacy activities they engage in—if they believe that the courses are useful, important, interesting, and worth their time—they will be more likely to persist with learning. More research is needed, however, on the approaches instructors can use to help adult and adolescent learners develop these values over time in relation to language and literacy activities they may not already value.

Using and Inspiring Learners' Interests

Adult learners are likely to put forth more effort and stay engaged in tasks they find interesting. Researchers have made a useful distinction between personal interest and situational interest, and both types have implications for motivating adult learners.

Personal interest is the interest that learners bring into classrooms; it represents their longstanding preferences. When students are personally interested in topics covered in reading passages, recall of the main ideas of the passages is enhanced and subsequent motivation in reading related texts is maintained.

Research on motivation has found value in giving readers opportunities to choose texts that connect with or expand their interests. When young readers are more engaged by the topic of a text, for whatever reason— whether they're trying to solve a problem or simply reading for amusement—they are more motivated to continue reading. Similarly, interest in the topic or purpose of a writing task predicts better writing performance among students in secondary schools.

To support persistence in adult literacy learners, instructors can use easy and cost-effective ways to learn about students' personal interests—for example, asking them to write on a sheet of paper (to be shared with the instructor only) five topics they find personally interesting and five they view as boring. Instructors can use this information to select texts, tasks, and assignments that will be meaningful and engaging to learners.

Situational interest is inspired by a particular event or characteristic of an experience, such as the features of a text or task. For example, a student who has not previously expressed any interest in writing persuasive essays might be become interested if the exercise is presented in a manner that inspires interest (e.g., the opportunity to experience the value of a persuasive essay for college or job applications, changing public opinion, or simply self-expression).

Using Digital Media

Digital media are a promising way to give access to a broad range of text genres and topics to stimulate interest in reading and writing for all students, including adults. The use of digital technologies—to expose learners to genres and topics, to scaffold their learning with prompts and other supports, and to help them practice—is likely to motivate their interest in at least three ways: technologies are novel, they can ease the unpleasant parts of practice, and they can empower the learner through development of valued, relevant digital literacy skills.

Strategies that literacy instructors can use to enhance learners' situational interest include:

- offering learners meaningful choices, such as allowing them to occasionally choose from among several texts in addition to other reading practice that is required;
- using well-organized texts;
- using texts that include vivid imagery;
- using texts about which learners have some prior knowledge;
- encouraging learners to actively and creatively think about the material they are reading; and
- making sure learners understand the material by providing them with relevant cues—for example, prompting them while reading or providing tools to help them organize the content and make sense of the material.

The real challenge, however, is moving learners from situational to personal, or sustained, interest in a way that inspires them to persist even when they face challenging reading tasks.

Encouraging Collaboration and Cooperation

Cooperation or collaboration in the classroom can motivate learners to persist and attain their goals. Learning environments and experiences that help establish positive

relations with others while developing competence in particular skills also shape engagement, motivation, and persistence.

Collaborative arrangements in which students work together to plan, draft, revise, or edit their texts can have a positive impact on the quality of their writing, but students need clear direction about what they are expected to do as they work with others. Opportunities to collaborate during reading and writing also can increase motivation, although more needs to be known about how to structure collaborations effectively.

Adults may also become more engaged if reading and writing activities provide opportunities to work with other adults to solve real-world problems. In addition to increasing the usefulness of literacy-based tasks and the sense of autonomy and control people have over their lives, these collective literacy activities may provide them with the community support needed to persist in developing their literacy even in the face of challenges.

One challenge to the motivating effects of group work is the possibility for actual or perceived negative perceptions and actions on the basis of differences, particularly race, gender, sexual orientation, and social class. (See "The Potentially Negative Effects of Stereotypes" on opposite page.)

Overcoming Systemic Barriers to Persistence

When designing adult literacy instruction, it is important to consider the contexts of adults' lives and how to remove demotivating barriers to access and practice. For adults to enroll and continue participating in adult literacy courses, they must perceive the courses as being important, useful, interesting, and worth the investment of time. They must also believe they can handle the short-term consequences of spending time improving their literacy, which may include temporarily having less time available for work and family.

Effective functioning in adulthood requires selectively allocating effort toward the most important and pressing goals in accord with the opportunities available. People allocate their cognitive, emotional, and physical resources to prioritize important goals, bal-

ancing responsibilities across work, family, community, and so on. In this light, lack of persistence in adult literacy instruction, while appearing to be a poor choice, actually may be a self-regulated, adaptive response to the constraints of competing demands and the need for trade-offs in life.

It should not be surprising, then, that the need for child care is a serious practical issue that affects participation and persistence. It is likely that programs to increase the availability of child care, particularly at no cost or at reduced rates, would facilitate the participation of many adults.

The Potentially Negative Effects of Stereotypes

Stereotype threat is an individual's concern that others in a group will judge her or him by a dominant stereotype. Stereotype threat is strong enough to disrupt performance and is typically heightened in situations in which individuals who might be connected with such a stereotype (e.g., "women are not good at mathematics") represent only a small number in the overall group.

In one study, for example, black college students who had demonstrated high capability in other testing situations performed poorly when told that their intelligence was being measured. Stereotype threats have also been documented among members of other racial and ethnic groups, as well as with respect to gender and cultural differences.

These findings have important implications for any adult literacy program or course in which groups come together from a variety of racial, cultural, and linguistic backgrounds, as well as for mixed gender groups. Indeed, stereotype threat can compromise learning in adult populations because it can be triggered by age. In Western culture, education is most strongly associated with childhood and early adulthood, and adult participation in formal instruction may be perceived as not happening at the "appropriate" time.

Awareness of stereotypes may divert attention that is needed to perform well on a task. When stereotypes are activated—in other words, when the learner is made aware of features of the stereotype that are relevant to him or her—working memory resources needed for effective performance may be diminished by distracting thoughts. Stereotype threat can be activated by seemingly innocuous features of the learning situation, like reporting one's gender on a mathematics test.

Because worries about whether one will confirm a stereotype to some extent involve inner speech, interventions that steer learners toward verbalizations that help them to focus on the task at hand have been found to reduce stereotype threat.

Directions for Future Research

Although the principles outlined in this booklet are well researched with other populations and can be applied with adults, studies on motivation and adult literacy are scarce.

Research is needed to:

- identify instructional approaches that motivate engagement and persistence for adults with low literacy;
- develop measures of adult motivation and persistence so that better information can be gathered on how to motivate adult learners' persistence;
- understand more about learners' motives and circumstances—in terms of jobs, families, health issues, and other factors—in order to design better supports for persistence;
- understand how the features of texts and tasks affect motivation;
- examine group differences and similarities in the factors that influence motivation to persist. Although principles of motivation apply across populations, learners may differ in their persistence based on age and other characteristics;
- identify technologies that could aid persistence, and determine how technologies can best be introduced and their use supported in ways that increase rather than decrease motivation; and
- identify the conditions that affect motivation to enroll in adult literacy courses.

Learners can underestimate the amount of time and effort needed to learn a complex skill such as literacy. Research on employee training in the workplace suggests that "pre-training" geared toward establishing appropriate expectations for learning new skills can be helpful both for the learner and for those whose support will be instrumental to the learner's success. Family, peers, supervisors, and coworkers can exert important influences on motivation. The limited amount of research that has examined people's motivation to persist in adult literacy instruction shows that people were more likely to persist if they had a strong social support network. They were also more likely to persist if they had previously engaged in learning experiences after formal schooling and had a personal goal, such as helping their children or obtaining a more lucrative job.

In contrast, persistence was undermined by the demands of everyday life and low levels of social support. More needs to be known about how to help adult learners set appropriate expectations for their progress and encourage the social support system they will need to persist.

Technologies to Support Adult Literacy

echnologies with the potential to support literacy development in adults and adolescents are rapidly emerging and becoming more affordable. Internet technologies also have the potential to alleviate barriers associated with limited times and places of instruction, allowing adults to learn and practice when and where it is convenient for them. And because the use of digital technologies is required for literacy in a digital age, it is important to incorporate technologies into literacy instruction.

Although it is likely that using technologies will add to the initial cost of literacy programs, the degree of differentiated and sustained support they can provide to adult literacy learners is great enough that investments in technology may be the most cost-effective solution. Thus, it is worth developing and testing the most promising new approaches so that their costs and benefits are better understood.

Many studies of the effectiveness of technologies in education have shown minimal and sometimes null results. This is not surprising. Technology does not of itself produce learning; it simply amplifies and extends instructional strategies. Too often, studies of technology effectiveness have paid inadequate attention to the content of the instruction and assumed that any technological strategy to amplify it would be effective. Neither do the studies attend sufficiently to the engineering and training required to implement the technologies effectively.

If well engineered and supported, the technologies described in this section could be used to amplify and extend effective instructional approaches.

Existing and Promising Technologies

Some of the following technologies for learning are available already and should be tried with adult learners, recognizing that they should also be evaluated since they have not been used or proven effective for adult literacy instruction. Other technologies are in development and not commercially available yet, but have promise for improving adult literacy.

Group collaborative communication software. This category includes the kinds of tools used in offices and homes every day—electronic calendars, email, text messaging, Facebook, wikis, and collaboration portals. New technologies for group communication, including tools for exchanging comments on written materials, are emerging regularly and may be especially helpful for adult learners.

Word processing software. The most basic tools that can help with literacy are standard word processing tools, which facilitate writing and especially editing. Controversies remain about features that make it easy to circumvent mastery of some literacy skills, notably spelling correction. However, for most adults and adolescents with limited literacy, the ability to get ideas on paper, read those of others, edit initial writing, and exchange ideas is dramatically enhanced by word processing tools and should therefore be encouraged. Word processing tools also can help adult learners engage in the many hours of practice they need to develop their literacy. Related tools, such as presentation software, are standard ways adults express their literacy in civic and work situations; part of being functionally literate today is the ability to use such tools effectively.

Bulletin boards and discussion tools. Once students are creating compositions and exchanging them, they need ways to hold conversations with each other about the texts. All of this is easily possible via bulletin board systems. On such systems, threads of conversation can be started about particular topics or posted texts. Students read additional documents and peer comments and then prepare and post their own com-

ments. This approach is promising because it provides students with multiple and engaging ways to practice as well as natural experience with the need to write for others' understanding.

Commenting tools embedded in programs. Contemporary online word processing programs provide commenting tools in online texts. Adobe Acrobat provides such tools for commenting on PDF files, and software packages on wiki or Moodle sites allow students to annotate texts individually as they read. Students can benefit from seeing which parts of a text prompt annotations and what their peers wrote in their notes. The use of commenting tools also mimics real-world work, providing both motivation and practice in some of the skills needed in the 21st century workplace.

Virtual meeting tools. A variety of new systems support online meetings with components that permit word processing and other tools to be shared over a network. That is, multiple people can talk to each other, write to each other, show each other diagrams and other media, and jointly edit a single text, PowerPoint file, or other document. Virtual meeting tools used in the world of work, partly to support working from home, could also benefit the education world. For adult learners, such tools can help overcome barriers to learning caused by the need to travel regularly to places of instruction and increase the time they spend engaged in learning beyond the classroom.

Speech-to-text and text-to-speech tools. Computer-generated speech (called text-to-speech) and speech recognition facilities (called speech-to-text) occur throughout society. Phone calls are answered by computers that then respond to spoken commands by consumers. High-end automobiles can respond to hundreds of voice commands, generally without training to handle a specific person's voice. It is entirely possible to develop texts that read themselves to a student and also systems that listen to students reading texts aloud and give corrective assistance if they make errors in their reading. A number of intelligent tutoring systems allow spoken student input as an alternative to typed input.

Embedding low-level coaching in electronic texts. One way to prompt students who may get caught up in word recognition to also think about meaning is to embed pop-up questions in texts that are presented on screen. The basic idea is that the prompts can be embedded in machine-readable text and then can appear automatically alongside the text to which they apply when the student encounters it. For example, pop-up questions can be tailored to match a system's best understanding of how the reader is processing the text in question. If the student is not spending enough time on important

but difficult content, a generic pop-up question might ask, "Are you sure you understand this section?" or specific pop-up boxes could offer strategies to apply and other background information or content to help learners understand the main ideas.

Automatic essay scoring. In many classrooms students are given relatively few writing assignments because of the time it takes instructors to read and comment on them. One possible approach is for students to comment on each other's work; demonstrations in college courses have shown that it is an effective teaching strategy, though this needs to be studied in the adolescent and adult literacy population.

In addition, recent advances in computational linguistics have made the automated scoring of texts possible. Some automated scoring systems have had agreement with human scorers over 80 percent of the time. Just as impressive, levels of human-machine agreement have been slightly higher than those achieved between pairs of trained human raters.

Intelligent tutoring systems. Since 1985, a number of intelligent tutoring systems have been developed that can track the performance of individual students on various tasks, provide tailored feedback, and intelligently guide students in ways that promote learning. Intelligent tutoring systems operate by trying to discover what pattern of present and missing knowledge best accounts for a student's performance. In the context of reading development, such systems would model the comprehension skills that a learner exhibits and then provide feedback to improve comprehension of text that is tailored to the learner's current level of knowledge.

Detection and tailoring to emotion and engagement level. Although just beginning to be developed, some intelligent systems already exist that are sensitive to emotion and, thereby, to the motivational state of the learner. Such systems suggest the potential of machines to be more flexible in engaging students by understanding when a text is not interesting to a person, for example, or when a task is producing an emotional

response that leads to avoidance rather than deep engagement.

Serious games. These games are designed with the explicit goal of helping students learn about important subject-matter content, strategies, and cognitive or social skills. The learner engages with curriculum content that provides learning opportunities as part of the game context. Many researchers believe that serious games have revolutionary potential because learning difficult content becomes an enjoyable, engaging experience for the learner; intellectual hard work is transformed into play. Very few serious games have been around for very long, however, so some researchers and game developers are unsure whether game design can be compatible with pedagogy. The more optimistic view is that there needs to be careful analysis of how to align the features of games with the features of effective pedagogy and curriculum. A better understanding is also needed of which learners are most likely to benefit from serious games as part of a program of literacy instruction.

Immersion environments. An example of the sophisticated level of intelligent training environments is the system called Tactical Iraqi, which has intelligent tutoring system components embedded in virtual reality with multiple fully embodied animated agents. This system was developed to help junior officers prepare for duty in Iraq, where they would need to interact with local tribal leaders in a new language and culture. The learners in this system are confronted with realistic situations, such as having to interact with graphically rendered actors in order to negotiate movement of a medical clinic to ensure that it is not damaged during needed military maneuvers. The system is highly engaging, presumably in part because the responses to learners' actions are both cognitive and emotional.

It is not yet clear that this level of realism is needed to engage adult and adolescent literacy learners or which learners would benefit most, but the mere fact that it might be possible sets the stage for research to examine what level of intelligent technology is cost-effective for enhancing effective literacy practice.

Electronic entertainment technologies and social media. While systems like Tactical Iraqi are expensive in the economic context of adult education, it may be possible to get similar effects from various kinds of entertainment tools, like role-playing environments and social media. These range from simple games to rather elaborate possibilities, such as Second Life, an online virtual world where people can interact using avatars to represent themselves. Funding agencies and public-private partnerships should be encouraged to explore possible uses with adult literacy learners. Even if the approaches add little content to what can be taught in other ways, the motivational

value of immersion environments can be substantial, and motivation and engagement remain a critical barrier to progress in literacy for adult learners.

Finally, there is a range of new social media, including Facebook, MySpace, and others, that generate large amounts of multimedia communication and might be useful for adult literacy learners. (Second Life also has a social medium component.) Because it is text-rich, social media has the potential to provide a portion of the practice that adults need to develop their literacy skills. Recently researchers have begun to design and implement social networking sites specifically to support and encourage literacy-rich educational activities for youth. Such approaches could be tried and studied further to improve adult literacy instruction.

Investing in New Technologies

Technologies, regardless of the form, should not entirely replace face-to-face instruction. It is vitally important to explore combinations of classroom-based and Internet- or computer-supported activity that may be effective for adults, depending on their literacy development needs and skills. Technologies can also help learners overcome barriers to learning that arise from needing to be in a particular place at a specific time to receive instruction. Several challenges will need to be addressed, however.

One challenge in using technology for adult literacy instruction is that institutions are often slow to adopt technologies that much more rapidly penetrate the general world of consumers. A further challenge is the learning curve for any new technology, during which initial costs are high and utility is not fully developed.

It is worthwhile to consider promising technologies that could be adopted across the adult literacy education system so that a single program would not bear the cost. Initial versions of instructional software can be very expensive because of the steep learning curve involved in the development of new software programs, but the cost becomes much lower with subsequent versions. Moreover, first-generation development costs for many of the instructional approaches likely to benefit adult literacy learners may be

borne by early adopters, such as the military.

Understanding whether a particular technology is worth the investment will require a sophisticated research funding strategy. Such a strategy would place good bets and sustain investment long enough for the technologies and their implementation to be refined sufficiently to affect learning, while maintaining the agility needed to adjust approaches given the rapid evolution of technology.

Directions for Future Research

- Studies are needed to establish how the efficacy of instructional approaches can be enhanced by technology and to clarify which subpopulations of learners benefit from various technologies.
- The benefit of instructional technologies is likely to depend on the particular subpopulation of adults using them. Studies are needed to examine the effects of technologies for those learning English as a second language, adolescents and adults with less than high school levels of literacy, learners with disabilities, and college students who need to enhance their reading and writing skills.
- Many specific uses of technology for adolescent and adult literacy instruction have been shown to be effective in small-scale, controlled studies. The next step will be to evaluate these technologies in studies with larger populations and in diverse settings. Also important is translational research that can show the ways in which an existing instructional system or organization can benefit from promising technologies.

In conducting this research, it will be important to develop the skills of adult literacy instructors so that they are able to use the technologies effectively to support adult learners.

ABOUT THIS BOOKLET

This booklet was prepared by the Division of Behavioral and Social Sciences and Education (DBASSE) based on the report *Improving Adult Literacy Instruction: Options for Practice and Research* (2012) which was authored by the Committee on Learning Sciences: Foundations of and Applications to Adolescent and Adult Literacy. The study was sponsored by the U.S. Department of Education. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the National Research Council and do not reflect those of the Department of Education.

A PDF of this booklet is available free to download at http://www.nap.edu/catalog.php?record_id=13242. Print copies are available from the National Academies Press at (800) 624-6242 or (202) 334-3313 (in the Washington, DC, metropolitan area) or via the NAP Website at www.nap.edu.

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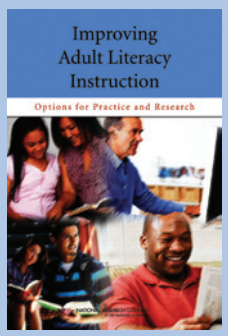
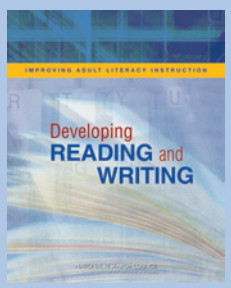
Drawing on the latest research evidence, this booklet, *Improving Adult Literacy Instruction: Supporting Learning and Motivation,* explains principles that instructors can follow to support literacy learning and students' motivation to persist in their studies. The booklet also explores promising technologies for adult literacy instruction.

Also of Interest…



This booklet is drawn from the National Research Council's report *Improving Adult Literacy Instruction: Options for Practice and Research.* The report recommends a program of research and innovation to gain a better understanding of adult literacy learners, improve instruction, and create the supports adults need for learning and achievement. The report also identifies factors that affect literacy development in adolescence and adulthood and examines their implications for strengthening literacy instruction for this population. In addition, the report explores technologies that show promise for supporting adult literacy learners.

The report is a valuable resource for curriculum developers, federal agencies, literacy program administrators, educators, and funding agencies.



A companion to this booklet, *Improving Adult Literacy Instruction: Developing Reading and Writing*, gives an overview of how literacy develops and explains instructional practices that can help adults learn to read and write. Intended to be a useful resource for those who design or administer adult literacy courses or programs, this booklet may also be of interest to teachers and tutors.

Copies of both booklets are available from the National Academies Press, 500 Fifth Street, N.W., Washington, DC 20001; (800) 624-6242; http://www.nap.edu.

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