

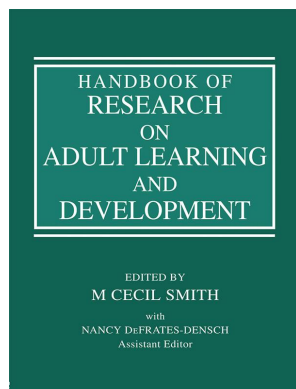
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Literacy in Adulthood

M Cecil Smith

Literacy is among the most important facets of adult life in modern societies. The abilities to read and write, perform basic mathematical tasks, and use technologies such as computers are considered to be essential skills of an educated individual who is able to function competently in the everyday world. Literate persons appear to have a number of economic and social advantages compared to illiterates. Adults who are literate are more likely to be employed and employed first. They have ready access to various kinds of text information that serve to inform, direct, enlighten, provoke, inspire, entertain, and keep them healthy. Literate adults can also use their literacy skills to provide assistance to others, including their children as they are learning to read and write. In contrast, adults who struggle with literacy tasks generally find that opportunities for well-paying jobs and advancement within the workplace are limited. Illiterate adults and those whose literacy skills are marginal may be unable to assist their children with homework. They are less able to navigate the health care system with its complex array of insurance documents and related forms. Further, low literate adults are less likely to participate in the activities that are characteristic of citizenship, such as voting or writing letters to local, state, or congressional representatives to advocate on behalf of themselves and others (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993). Performing one's job, raising a family, being a "smart" consumer, fulfilling citizenship roles such as voting, engaging in leisure—all of these roles require some degree of literacy to fully accomplish.

Certain evidence suggests, however, that there is an extensive adult literacy problem in the United States that impedes adults' success in the workplace, impairs opportunities to fully engage in community life, and prevents healthy development. The results of the 1992 *National Adult Literacy Survey* (NALS), which assessed the abilities of adults ages 16 and older to perform various prose, document, and quantitative literacy tasks, revealed that nearly half of the population scored at the two lowest levels of literacy proficiency (Kirsch et al., 1993), suggesting an inability on the part of many adults to accomplish everyday literacy tasks. More recently, the 2003 *National Assessment of Adult Literacy* (NAAL) found that 14 percent of the adult population, ages 16 and older, scored at the "below basic" proficiency level, representing approximately 30 million adults. Another 63 million adults were found to have only a basic level of literacy proficiency. Thus, there has been little improvement in the distribution of adults' literacy skills over the past decade, with low literacy concentrated among minority, immigrant, elderly, and low-education adults. These two national literacy assessments will be discussed in more detail later in this chapter.

Other findings suggest that the apparent U.S. adult literacy "problem" may be overstated. For example, when adults who participated in the NALS were asked to evaluate their own literacy skills, most did not believe that they had a problem with literacy (Kirsch et al., 1993). Data from the 1995 International Adult Literacy Survey (IALS)

revealed that 95 percent of American adults thought their literacy skills were satisfactory for meeting their job demands. These self-evaluations might mean that the adults who were assessed at lower literacy levels were not particularly bothered by their apparent lack of literacy. Or, perhaps low-literate adults rarely put themselves in situations where their literacy skills are challenged and, so they do not perceive any difficulty. But, when low-literate adults lose their jobs or have to change jobs, they may not be able to read well enough to find employment—which is clearly a problem for them.

The discrepancy regarding the suitability of adults' literacy skills for meeting the economic, family, and workplace demands of living may also be due to a lack of consensus about how literacy is best defined (Pont & Werquin, 2001; Venezky, Wagner, & Ciliberti, 1990). Discussions of literacy proficiencies require a nuanced view because of the existing differences of opinion regarding the extent of the adult literacy problem. While educational policymakers point to the large numbers of U.S. adults who perform at the lowest levels in assessments such as the NALS, some researchers claim that there is no evidence of a decline in the skill levels—including literacy skills—of workers in the American labor force (Handel, 2005). It is generally agreed, however, that there is an uneven distribution of literacy in the adult population, in a manner that is similar to the uneven distribution of wealth in the United States.

Rather than specifically addressing the problems of low literacy among adults, however, this chapter is concerned with the nature of adults' literacy skills and practices and, in particular, the ways in which literacy may contribute to adult development and learning. There is abundant evidence to show that the lack of literacy is an impediment in life for individuals in modern, rapidly-advancing cultures where knowledge, as acquired through exposure to the written word, is indispensable social capital. Yet, the other side of the coin—what being literate means in terms of promoting and supporting adults' development—is not often directly addressed in the literature. Therefore, in this chapter, I provide some insights on this matter by drawing upon the research that has examined adults' literacy skills, as well as the work that has demonstrated how adults benefit by learning and using literacy. Further, I examine the nature of literacy practices—which extend beyond reading to include writing and mathematical abilities and, to some extent, the everyday uses of technology—and how these practices may impact adults' lives and development.

Plan of Chapter

I begin with a definition of literacy, acknowledging that there are different perspectives on what it means to be a literate person. These different views of literacy play out in the methodological lenses that are fitted to the study of literacy behaviors and skills across the life span, and how the data are interpreted through these lenses. Arguments about the extent to which adults are “literate enough” to function effectively in society largely turn on the particular theoretical perspective that is upheld. These perspectives determine the methodological approaches taken to study literacy skills and practices, the resulting data, and the manner in which the results are interpreted. I next turn to an examination of the relationship between educational attainment and literacy, acknowledging the reciprocal benefits of one for the other. In subsequent sections, I synthesize the research that has investigated adults' literacy practices in regards to reading, writing, basic math skills or numeracy, and the uses of technology. The chapter concludes with a few comments regarding the role that literacy plays in adult development.

Literacy Defined

Definitions of literacy have shifted over time, from so-called signature literacy (Kaestle, 1991), that is, having the rudimentary ability to sign one's name on a document (taken as indicative of the ability to read and/or write), to the amount of education the individual has attained (thereby correlating progress in school with increased reading and writing abilities). More recently, emphasis has shifted to considering what people can do with literacy and the role that literacy plays in assuring one's ability to participate in the workforce—thereby ensuring personal economic well-being—and to engage in civic activities. Thus, literacy of late has been characterized by the functional purposes it serves. For example, the National Literacy Act of 1991 defined adult literacy as

an individual's ability to read, write, and speak in English, and compute and solve problems at levels of proficiency necessary to function on the job and in society, to achieve one's goals, and develop one's knowledge and potential. (Public Law 102-73, Sec. 3, n.p.)

The current functional conceptions of literacy view reading and writing as enabling individuals to accomplish things in life, to be productive, and to provide for oneself and one's family. This view also implies that literacy contributes to individual growth and development, and to a sense of well-being and personal satisfaction.

Theoretical Perspectives. This functional perspective on literacy is not universally embraced, however, and there are dissenting views and competing definitions of literacy (Venezky et al., 1990). Two theoretical perspectives on literacy (i.e., reading) development are apparent in the literature and therefore deserve attention. These perspectives embrace somewhat different methodological traditions, and they define what it means to be literate in different ways. One perspective focuses on reading as primarily a cognitive skill. This psycholinguistic view—rooted in cognitive psychology, information processing, and studies of language acquisition—holds that reading ability consists of a number of cognitive processes and sub-processes, including letter and word recognition, phonemic awareness (i.e., understanding that spoken words are made up of a series of sounds), and sound-to-letter correspondence. As these component skills are developed, through exposure to print in the environment, explicit instruction and practice, and as the child's oral language skills and sight word vocabulary grows, they contribute to the development of comprehension—the desired goal when reading written text. A long tradition of empirical research in cognitive psychology has been devoted to understanding comprehension processes, generally focusing on how individuals understand, interpret, and remember segments of texts that are presented under varying task conditions (e.g., high vs. low prior knowledge; easy vs. difficult text versions) (Bransford & Johnson, 1972; Kintsch, 1977, 1988). The psycholinguistic view argues that reading is a portable skill that can be applied in any situation involving written text. This skills-based approach to understanding literacy is most closely aligned with the functional literacy perspective.

A second theoretical perspective argues that reading is but one of a number of literacies in which individuals may participate. This view suggests that reading and its associated literacies (e.g., writing, speaking, numeracy) are not simply cognitive skills, but are ways of interacting with others and ways of representing oneself, as well as ways of interacting with, understanding and using the written word (Barton & Hamilton, 2000; Chouliaraki & Fairclough, 1999). Literacy learning is said to be socially constructed and

situated in specific contexts such as the home and school, workplace, and the community. Reading ability, therefore, can be fully understood only within the particular social roles and contexts in which the reader participates (e.g., an engineer reading a memo at work; a parent assisting their child with homework; a commuter examining a train schedule).

Individuals' *perspectives* on their own literacy skills and practices are equally important to understanding literacy proficiency as are assessments of their literacy skills (Fingeret & Drennon, 1997; Knobel, 1999; Lewis, 2001). This phenomenological view is sometimes referred to as the social practices perspective of literacy (Barton, 1994; Baynham, 1995; Sheridan, Street, & Bloome, 2000) and is associated with the so-called New Literacy Studies exemplified by the work of Barton and Hamilton (1998) and Street (1984). Pure cognitive abilities, as these relate to reading skills, are less critical in the social practices perspective because there are numerous ways that individuals might acquire meaning from texts and engage in literate acts. Generally, literacy research that is rooted in this perspective is largely qualitative, and ethnographic methods are employed which entail extensive observations of literacy practices (e.g., Barton, Hamilton, & Ivanic, 2000). Critical discourse analysis, which treats language (including written text) as a social practice and which considers the various ways in which people use language and texts, is another method (e.g., Rogers, 2004).

Literacy skills cannot be separated from the social contexts in which literacy takes place or from its social purposes, according to the social practices perspective. Thus, reading as a literacy practice is *situated* in the interactions between people, between individual readers and the texts they use or produce, and their personal literacy goals, as well as the meanings that individuals attach to their reading and writing behaviors. It is possible to engage in a literacy practice such as reading without actually having the ability to read as, for example, when a person relies upon a friend, coworker, or family member to read and interpret a letter, form, or legal document (Reder & Green, 1983). Here, both parties are "literate" in that they inhabit a common social and intellectual space where a given text must be negotiated, interpreted, and shared.

Clearly, the social practices perspective considers reading in a much different manner than does the psycholinguistic perspective—which seeks to examine, measure, and track the development of isolated reading skills, and to determine individual differences in the component processes of reading (Daneman, 1991). From a social practices perspective, attempts at curriculum standardization or assessments of students' reading skills are meaningless and unproductive because these activities do not acknowledge the socially constructed nature of literacy.

Given these different theoretical perspectives, it is important to consider the role of formal education in literacy development, as schools are places where explicit literacy instruction occurs, where literacy demands are greatest for children and youth, where a particular view of literacy is widely embraced (i.e., the cognitive skills perspective), and where students' literacy skills are repeatedly evaluated to determine the need for further (or different) instruction.

Education and Literacy

Traditionally, schools have been the principal setting where the individual's literacy skills are acquired—both through explicit training (i.e., reading instruction) and direct exposure (i.e., to literate role models, to the literacy tasks that make up or which are imbedded in academic work). Certainly, education and literacy are closely entwined and students' progress in school is assumed to denote that they are developing their literacy

skills and becoming literate persons. Thus, schooling's contribution to the acquisition of literacy has been termed a *literacy development effect* by Reder (1998). Students who fail to learn to read, or whose progress in reading development is not on par with their peers, are at great risk for academic failure because so much of schooling is dependent upon the individual's ability to comprehend—and subsequently, to produce—written text. Good readers move ahead in school, increasing their vocabulary knowledge through exposure to texts, acquiring world knowledge, and further developing their literacy skills. Poor readers, on the other hand, are stymied in their knowledge development as they struggle to comprehend texts. Over time, poor readers—in particular, those from economically disadvantaged backgrounds—fall further and further behind their more able classmates (Allington, 1980).

Stanovich (1986) referred to the gap between able and less able readers as “Matthew effects,” (i.e., the rich [good readers] get “richer,” as they improve their reading skills, and the poor [struggling readers] get poorer, falling further behind in school). Specifically, Stanovich identified the mechanisms through which this gap occurs. Students' inability to master the print components of early reading results in failure to acquire adequate vocabulary from print, poor reading comprehension, and the inability to use reading to learn new information. Thus, Stanovich argued, it is essential that schools and teachers focus on helping students acquire print-related skills (e.g., phonemic awareness) through explicit instruction in these skills.

Literacy practices in school are those that are officially sanctioned—i.e., teacher-produced reading and writing assignments, and commercially-produced textbooks. Students are, of course, encouraged to read outside of school (i.e., homework, library books). But, the kinds of literacy practices in which they might engage outside of school (e.g., reading comic books, playing video games, writing poems or plays for their own amusement, creating web pages), and beyond the constraints of the official curriculum, are frequently not recognized or valued by their teachers or parents. Students soon learn that the only literacy that “counts” is that which is assessed at school.

Literacy ability can also be seen to contribute to the educational attainment of individual learners. That is, those students whose literacy skills are sufficiently well-developed (i.e., as determined by standardized tests) to ensure their success in school are more likely to continue their education compared to those students whose skills are deficient. Reder (1998) has referred to this relationship as a *literacy selection effect*. Students who are successful with literacy in school earn good grades, thereby reinforcing their academic efforts and increasing the likelihood that they will continue their schooling. The problem is not, of course, that those students who learn to read do well in school and increase the achievement gap between themselves and those who do not learn to read well. Rather, the problem is that literacy is poorly *distributed*: Schools have not been successfully in closing the reading achievement gap between White and minority, affluent and poor, and learning disabled and normal ability students.

Despite their obvious entanglement, schooling and literacy are not synonymous. Much literacy learning can place before (but often does not, c.f., Hart & Risley, 1995) the child begins formal schooling. Infants, toddlers, and preschoolers acquire language early in life and they participate in a variety of pre-literacy activities (Teale & Sulzby, 1986), and many children are immersed in rich print environments within their homes. Parents and other caregivers read to children to give comfort and establish predictable routines of storybook reading, for example. In doing so, caregivers point to pictures and colorful drawings, and they demonstrate the different features of books to children. Young children observe their parents, siblings, and others reading and writing,

and discussing these activities. Through these observations, many young children recognize the apparent importance of books, magazines, and newspapers long before they are able to read these texts themselves (Bus, van IJzendoorn, & Pelligrini, 1995). In addition, many preschoolers watch *Sesame Street* and countless other television programs and videos, listen to music, shuffle magnet letters on the refrigerator door, and play rhyming games with siblings. All of these activities are, in one form or another, socially determined literacy practices having significant meanings for children as well as their caregivers (Heath, 1984). Such literacy practices precede children's abilities to decode, understand, and create written language.

Of course, not all children are raised in homes where they are exposed to positive literacy role models, and they lack exposure to powerful language experiences and opportunities with play with and use written materials (Hart & Risley, 1995). Other children may get rich exposure to oral language at home, but these language interactions do not prepare them for the extensive demands of the print-based curriculum when they enter school (Heath, 1984). A number of investigators have documented the effects of lack of early language and literacy-related experiences on young students' success in school (Baker, Serpell, & Sonnenschein, 1995; Hart & Risley, 1995).

While early literacy experiences are thought to be necessary for success in school, they are not sufficient for literacy learning. Formal instruction in reading, writing, and mathematics are also deemed to be essential. Yet, clearly not all students respond well to literacy instruction and some children will fail to learn to read and write. Often, such circumstances are due to insufficient or improper instruction, undiagnosed learning disabilities or other intellectual impairments, low motivation, or the lack of timely interventions. Too often, these students are simply passed along from one grade to the next, despite their inability to read well. Thus, having earned a high school diploma is no guarantee that the graduate is able to read and write well—or at all.

Nonetheless, it is also true that some people can develop expert literacy skills despite a lack of educational preparation. It is also possible for adults to carry on with their lives, to work and to raise their families without being “functionally” literate in the traditional sense of being able to read, write, or perform basic arithmetic (Fink, 1998). Yet, even those adults whose literacy abilities—as measured through standardized assessments—place them at the very bottom of the skills distribution, often possess a sufficient level of literacy knowledge to “get by” in their everyday lives. Such individuals frequently resort to a variety of compensatory behaviors (e.g., asking others for assistance with reading and writing tasks) and strategies (e.g., guessing, attentive listening, memorizing) that allow them to function in a print-saturated environment (Kozol, 1985; Merrifield, Bingman, Hemphill, & deMarrais, 1997; Reder, 1994; Smith & Locke, 1998). One recent example of an illiterate adult who nonetheless achieved the pinnacle of success in his professional life is that of the former National Hockey League coach, Jacques Demers. Demers, a French Canadian whose team won a Stanley Cup championship in 1993, reported in his biography (Leclerc, 2005) that he was able to hide his illiteracy from nearly everyone, including his wife, by asking secretaries and media relations people to write letters for him, claiming that his English skills were not sufficient to understand contracts and other business-related documents (he was non-literate in his native French as well).

There are substantial data suggesting that large numbers of U.S. adults have limited reading skills. Several recent national assessments of adult literacy have shown that up to 90 million adults display some difficulties with a variety of reading tasks (Kirsch et al., 1993), although there is much disagreement about the source of these observed

deficiencies (Sticht, 2001). In the next section of this chapter, I describe three national surveys of American adults' literacy abilities.

Assessing the Literacy Skills of U.S. Adults

Over the past three decades, the U.S. government has conducted periodic assessments of the literacy proficiencies of adults. These efforts have been fueled, in part, by concerns among government and business leaders that the literacy skills needed for the U.S. workforce to remain competitive in the global arena are increasing, while the literacy skills of adults are not keeping pace with workplace demands (U.S. Department of Labor, 1991). Thus, these assessments have been firmly grounded in a functional perspective. Also, literacy as it is used in these assessments is considered to be synonymous with reading. That is, only reading skills have been assessed, although some information was gathered (but never fully reported) about respondents' writing practices and other activities in which they used math.

Young Adult Literacy Survey (1985)

Although a number of assessments of adults' literacy skills had been conducted in the 1970s (Sticht & Armstrong, 1994), the Young Adult Literacy Survey (YALS), conducted by the Educational Testing Service on behalf of the U.S. Department of Education's National Center for Education Statistics, began a new era of literacy assessments (Kirsch & Jungeblut, 1985). The ETS approach was based upon a cognitive information-processing framework for literacy skills assessment. This framework enabled the designers to create items that had a range of information processing requirements, from having the test-taker simply locate and match written information in a document to generating a theme or an organizing principle from a lengthy prose passage. The YALS designers determined the specific information-processing requirements of each literacy task that was included in the assessment.

Factor analyses of the items led to the conclusion that three types of literacy tasks could be represented on different scales: prose, document, and quantitative (PDQ) literacy. *Prose literacy* is "the knowledge and skills needed to understand and use information from texts that include editorials, new stories, poems, and fiction" (Kirsch et al., 1993, p. 3). Examples of prose tasks include finding information in a newspaper article, or inferring a theme from a poem. *Document literacy* is "the knowledge and skills required to locate and use information contained in material that include job applications, payroll forms, transportation schedules, maps, tables, and graphs" (p. 3). Examples include locating an intersection on a street map and entering personal information on a job application form. *Quantitative literacy* is "the knowledge and skills required to apply arithmetic operations...using numbers embedded in print materials" (pp. 3–4). Examples include balancing a checkbook and summing catalog purchases on an order form.

This multi-scale approach was thought to better reflect the multifaceted nature of literacy than would a single measure of literacy. The PDQ assessment thus resulted in a profile of literacy skills. The advantage of this approach is that it eliminates the arbitrary use of cut points or a single standard to distinguish "illiterate" from "literate" adults—a longstanding practice in the history of literacy in western societies (Kaestle, 1991). The three skill domains encompassed the predominate types of text materials and literacy tasks that young adults encounter in their everyday lives. There is some evidence, however, that rather than assessing three dimensions of literacy ability, the PDQ

approach actually taps into a generalized form of literacy ability. Reder (1998), in an analysis of the 1992 National Adult Literacy Survey results, found high intercorrelations ($> .90$) among the three scales—suggesting that these literacy proficiencies are the same. Nonetheless, the three scales were used in two subsequent assessments of adults' literacy skills, described below.

The literacy skills of a nationally representative sample ($N = 3,474$) of American adults ages 21 to 25 were assessed in the YALS. The results showed a majority of young adults were able to successfully perform literacy tasks at the lower proficiency levels for prose, document, and quantitative literacy. At least 95 percent of the 21- to 25-year-old population achieved the 200 level (on a 500-point scale, with the mean equal to 305). Only slightly more than one-third (37%) of young adults achieved an above-average score of 325 for prose proficiency, document proficiency (38%), and quantitative literacy proficiency (38%). Fewer than one in ten young adults achieved PDQ proficiencies equivalent to 375. Whites and those having more education demonstrated higher PDQ literacy proficiencies than other racial/ethnic groups and those with less education.

National Adult Literacy Survey

The 1992 National Adult Literacy Survey (NALS) was the first comprehensive, nationwide assessment of adults' literacy abilities in the United States—and the largest such study of American adults' literacy that has ever been conducted. More than 26,000 adults, ages 16 and older, participated in the NALS, completing both the PDQ measures and an extensive background interview that gathered data on individuals' demographic characteristics, primary language, labor force participation, educational background, civic participation, and literacy practices.

Employing the same methodology as the YALS, a 500-point scale (with a mean of 250 and a standard deviation of 50) was adopted by ETS to report adults' literacy proficiencies. Five levels of literacy ability were described. Level 1 (score range = 0–225) is the lowest level. The results showed that about one-half of the adult population (estimated at 90 million adults) scored at the two lowest proficiency levels on the PDQ scales. Adults who performed literacy tasks at Level 1 were able to locate single pieces of information in brief texts and could accomplish relatively simple arithmetic operations. Many of those scoring at the two lowest levels were adults who reported having significant health problems or mental or physical disabilities (3% to 87% of those in levels 1 and 2, depending upon disability), or they were disproportionately recent immigrants who did not speak or read English.

In many cases, Level 1 and Level 2 adults were able to complete more complex, higher-level literacy tasks, but they were significantly less likely to do so than are those adults who performed at the higher literacy levels. Adults at Level 5 (score range = 376–500), the highest literacy level, could make high level inferences, using their background knowledge, when reading densely-packed and complex texts. They could also perform multiple quantitative operations sequentially, among other literacy abilities. Level 5 readers represented only about 3 to 4 percent of the adult population, however, and were those individuals most likely to have the greatest amount of education, worked in high-status jobs, and were White.

The NALS results did not go unchallenged, as a number of adult literacy experts questioned the validity of the findings. That a large segment of the adult population has low literacy abilities resulted from the design of the NALS assessment, according to Sticht (2001). To briefly explain, item response theory (IRT) was used to estimate adults'

literacy abilities from their responses to a small number of tasks that were administered to each test-taker. IRT is a statistical method for scaling individual test items for difficulty in such a way that a given test item has a known probability of being correctly completed by individuals having particular background characteristics and performing at a given level of proficiency. The criterion for assignment to a skill level was an 80 percent probability of getting the average item correct at a given literacy level (Kirsch et al., 1993, p. 71). The difficulty level of each literacy task was then placed along a scale. The resulting performance of groups of test-takers was also plotted along the same scale. Thus, scoring of the PDQ measures was based on the difficulty of each scale item, the probability of correct responding, and both respondent and task characteristics.

As Sticht (1999, 2001) has noted, the probability level could have been set at either a higher or lower value, but .80 is a fairly high criterion for most everyday literacy tasks. If an individual reads a newspaper article, for example, but does not understand something within the text, the reader has several alternatives. The individual might turn to another information source, such as television news, or might consult a dictionary or encyclopedia. Alternatively, the reader could ask another person to explain the meaning of the unknown word or phrase. None of these alternatives are possible on assessments such as the NALS. The result is that adults appear to be less proficient in their literacy abilities than they actually are. In fact, when asked as part of the NALS background interview, the majority of adults rated their literacy abilities as “good” (Kirsch et al., 1993), apparently confident that they can accomplish most of the everyday literacy tasks that they encounter. Recall also that even adults at the lowest literacy levels could complete some higher-level tasks. Sticht (2001) argued that setting the probability level at .50 (the point at which the errors are equal when claiming that adults either can or cannot perform specific literacy tasks) would have decreased the number of low-literate adults as much as fifty percent. Thus, the number of “illiterate” adults remains open to interpretation.

National Assessment of Adult Literacy

This 2003 assessment of adult literacy was a somewhat smaller follow-up to the NALS. A nationally representative sample of more than 19,000 U.S. adults, again from age 16 up, participated. Like the NALS, prose, document, and quantitative literacy skills were measured. A primary purpose of the NAAL was to track trends in adult literacy over the decade since the NALS.

NAAL scores were grouped into four levels: *Below Basic*, *Basic*, *Intermediate*, and *Proficient*—in contrast to the NALS’ five levels of literacy proficiency. Below Basic is the lowest level indicating that adults at this level possess only the most simple and concrete literacy skills. Proficient adults, in contrast, can complete complex, challenging literacy tasks. Although only broad descriptive results from the NAAL were available at the time this chapter was written, there was little change between 1992 and 2003 in adults’ abilities to read and understand sentences and paragraphs or to understand documents such as job applications. On one hand, this result is somewhat surprising as there was increased attention, following the release of the 1992 NALS results, to the role of adult basic education programs in developing low-literate adults’ literacy skills. Both the National Institute for Literacy (NIFL), established by mandate as part of the 1991 National Literacy Act, and the National Center for the Study of Adult Learning and Literacy, a research and dissemination center funded by the U.S. Department of Education, assumed national leadership roles in promoting and studying adult literacy education, served as resources for adult literacy programs, and in NIFL’s case, helped to coordinate literacy services and policy.

On the other hand, the lack of improvement in the distribution of adults' literacy skills is not surprising because of changes in the adult population over the decade from 1992 to 2003. For example, there are more non-English-speaking immigrants in the country (Reder & Edmonston, 2000). Also, the adult population has aged. Cognitive research on aging (Schaie, 1994) has demonstrated there are declines in some aspects of intellectual performance with age. The extent to which such declines might impair older adults' literacy skills is uncertain but is likely to be non-trivial.

More generally, at what level is an adults' literacy ability too low to enable them to function effectively at work, in school, or within the larger community? This is, of course, an important policy question because accurate estimates are needed of the number of adults that require compensatory education programs, such as adult basic education (ABE), to improve their reading skills. Adults scoring at the lowest level of these national assessments are thought to have difficulty navigating daily life. However, only about 1 in 4 of these low-literacy adults indicated that they did not read or write English well! Thus, many adults do not concur with the assumption that they have a literacy handicap—and therefore, are not likely to enroll in ABE programs.

How Low Is Too Low? Arnbak (2004) conducted a study of 194 Danish adults in adult education programs who were studying to earn the equivalent to a high school diploma. The purpose was to determine the minimum literacy level below which poor reading skills would be detrimental to educational success. Data were gathered on the adults' reading comprehension skills, decoding abilities, primary language spoken, teacher and student ratings of students' reading skills, and course examination grades. Arnbak found that the adults who scored in the lowest tenth percentile for reading ability obtained examination grades that were below the mean in classes for which there were substantial reading demands. Thus, for these adults, poor reading ability was a substantial barrier to attaining a diploma. While many adults who perform at low levels on standardized literacy assessments may not view themselves as having a literacy handicap, there is a segment of the low-ability population who do see their lack of literacy as a barrier to workplace advancement, economic success, and life satisfaction. It is these individuals who are most likely to seek out adult literacy education programs.

Improving Adults' Literacy Skills

The Secretary's Commission on Achieving Necessary Skills (SCANS; U.S. Department of Labor, 1991) described five competencies that students must acquire in order to be well-prepared to function in the modern workforce. According to the SCANS report, effective workers possess competencies that help them to productively use *resources* (enabling them to allocate time, money, materials, and space), *information* (enabling them to acquire, evaluate and interpret, and communicate data), *systems* (enabling them to understand, design, and improve social, organizational, and technological systems), and *technology* (enabling them to select equipment and tools, and apply technologies to specific tasks). Further, effective workers have *interpersonal skills* (enabling them to work with teams, teach others, serve customers, and work well with people from diverse backgrounds). These competencies necessitate the development of sophisticated reading, writing, and arithmetic skills. Some experts have expressed concerns that students graduating from high school (and those who fail to graduate) lack the necessary literacy skills to function effectively in the workplace (Landrieu, 2006; Smith, 2000).

While the percentage of high school dropouts decreased during the 1990s (U.S. Census Bureau, 2000), school dropout continues to be a problem—particularly in urban areas and among Black and Hispanic youth. In 2001, more than twenty percent (21.1) of Hispanic youth ages 16–19 had dropped out of school, and nearly 12 percent (11.7) of Black youth ages 16–19 had done so. Some of these dropouts and others go on to earn a GED or high school equivalency diploma. Those whose reading skills are not adequate to take the GED test, and many older adults who are poor readers, enroll in adult basic education (ABE) programs to improve their reading and related literacy skills. Nearly three million adults participated in basic skills courses in 2004–2005, according to the U.S. Department of Education (2006). Non-English speaking immigrants to the U.S. enroll in English-as-a-Second Language (ESL) programs. Of these adults, many are well-educated and literate in their native language but not in English. Others are non-literate in their native language as well as in English. Almost two million adults participated in ESL programs in 2004–2005, according to the U.S. Department of Education (2006).

There are many reasons for poor reading skills among adults, including the following problems: low verbal intelligence and cognitive deficits that impair short-term memory and comprehension; physical disabilities such as low visual acuity; poor oral language comprehension; inadequate word decoding skills; not a native speaker of the language; poor educational preparation and/or inadequate reading and language arts instruction; inadequate exposure to and practice at reading real texts; and having reluctant, hostile or otherwise poor attitudes toward reading (Singer & Donlan, 1989). Strucker, Yamamoto, and Kirsch (2007) investigated the relationship of the “component skills” of reading (e.g., phonics, fluency, oral language, vocabulary) to low-literate adults’ literacy proficiency, as measured by the prose literacy test used in the International Adult Literacy Survey (IALS), which was closely related to the NALS. Strucker et al. found that adults at the lowest literacy skill level were poor at word decoding and oral vocabulary, and appeared to have severe short-term memory problems. Thus, these adults have unique cognitive skills deficits.

These deficits can be remediated, however, with appropriate educational interventions. Although adult education programs to improve U.S. adults’ literacy skills have existed in one form or another since the post-Civil war era (Gordon & Gordon, 2003; Sticht, 1989), it has only been during the past 40 years that the federal government has played a substantial role in providing support for these programs (Sticht, 2002). Despite the infusion of federal dollars into adult literacy education, there have been remarkably few studies of the effectiveness of these programs for helping adults learn to read. Existing studies suggest that adult literacy programs are ineffective.

Do Literacy Skills Programs Work?

Beder (1999) conducted a meta-analysis of 23 outcomes and impacts studies of adult literacy education conducted over approximately three decades (late 1960s to late 1990s). These studies were selected from an initial sample of 115 such studies, having met a number of criteria, including adequate sample size and the inclusion of comparison or control groups. Beder found the evidence was insufficient for determining if ABE participants improve their basic literacy skills. ABE participants self-reported that their literacy skills and self-image improved as a result of participation, however. Two recent empirical studies provide additional evidence that adults participating in literacy education and basic skills courses do not improve their literacy skills.

Friedlander and Martinson (1996) were able to randomly assign adults to either adult basic education (ABE) classes or to no-ABE (control) conditions. This is the only randomized trials study in the adult basic education literature. Both groups consisted of adults who were school dropouts and received benefits from the Aid to Families and Dependent Children program. ABE program participants did not differ from the non-ABE adults on standardized reading measures following several months of reading instruction. More ABE participants went on to earn a high school equivalence diploma, however, than did the non-ABE adults. Thus, participation appeared to have an impact on learners' educational motivation but not their reading skills.

Drawing upon data from the 1992 NALS, Sheehan-Holt and Smith (2003) analyzed the associations of participation in adult basic skills programs with literacy proficiencies and reading practices (e.g., reading books and periodicals). Two groups were compared: adults who had or had not—based upon self-report—ever participated in a basic skills program to improve their reading, writing, and/or math skills. Both groups were similar in terms of age, native language, educational attainment, and other important background variables. The basic skills program participants were found to be not different from non-participants in regards to their reading abilities. There were only a few group differences in regards to reading practices, with those who participated in workplace basic skills programs having more extensive document reading practices than those adults who took part in basic skills programs in other settings (i.e., community programs, military). The combined findings from these two studies call into question the benefit of such basic skills education programs for low-literate adults.

Although it is evident that a significant portion of the adult population demonstrates limited literacy proficiencies, substantial numbers of adults are able to read, write, and perform basic mathematics sufficiently for the life and work roles that they inhabit. The next section of this chapter describes the research that has examined adults' reading, writing, math (numeracy), and technology skills.

Dimensions of Adult Literacy

Reading

The study of reading is prevalent within cognitive and educational psychology (Smith, Locke, Boisse, Gallagher, Kregel, Kuczek et al., 1998). The principle foci of investigations of adults' reading skill have centered on knowledge acquisition (Stanovich, West, & Harrison, 1995; West, Stanovich, & Mitchell, 1993), comprehension (e.g., Carver, 1977; Magliano & Millis, 2003) and memory for information derived from text (e.g., Meyer, 1975; Rice, 1986). Much less common are studies of adults' reading practices, although there is empirical literature on this topic going back to at least the 1930s (e.g., Waples, 1938). Literate adults read in a skillful manner, for many reasons, and to accomplish a variety of purposes. They read to gain knowledge and acquire information, for recreation and leisure, for personal empowerment, to cope with life problems, to increase work effectiveness, to facilitate social and community interactions, and to participate in civic activities (Guthrie & Greaney, 1991). Adults who read extensively, purposefully, and skillfully have been characterized as mature or expert readers.

Development of Reading Skills. Few studies have tracked the development of adults' reading skills over time to determine growth in reading ability and the individual and social factors that contribute to such growth. Bray, Pascarella, and Pierson (2004), however,

analyzed longitudinal data gathered from a nationally-representative sample of 1,054 college students enrolled in 18 higher education institutions across the United States. Reading comprehension skills and attitude toward literacy were assessed at the beginning and end of the study and data were collected annually across the first three years of college. Linear regression models were tested to determine predictors of reading growth in college and changes in attitude toward literacy. Potentially confounding influences on reading growth were controlled as seven sets of predictor variables were regressed to determine their associations with end-of-third-year reading comprehension and literacy attitude. The predictor variables were: pre-college characteristics (e.g., reading comprehension; gender, race); amount of secondary education (e.g., credits completed); amount of reading (e.g., number of books read); quality of classroom experiences (e.g., perceptions of effective teaching); involvement in academic activities (e.g., library experiences; required writing assignments); patterns of coursework (e.g., math, science, social science, technical, arts courses taken); and, activities not associated with coursework (e.g., work responsibilities).

Young adults' reading comprehension ability upon entry into college was significantly associated with their end-of-third-year reading comprehension. Race was also associated with reading ability at the end of the third year of college, as White students were found to have made significantly larger net gains than did students of color. The number of credit hours completed, the number of assigned books read, and students' perceptions of having been exposed to effective instruction (e.g., organized, clear teaching) were also significantly associated with reading comprehension following three years of college. Pre-college reading ability and literacy attitude, and number of assigned books read in college were associated with literacy attitude at the end of three years of college, as was gender (i.e., males made larger gains), and some aspects of involvement in academic activities (i.e., library experiences). The college experience factors that were associated with reading growth were the amount of college education attained (i.e., number of credit hours earned) and two literacy practices—the amount of reading completed in college (i.e., number of book read) and the amount of writing required (for above-average readers only). Being exposed to effective teaching was also a significant factor in reading growth in college.

Thus, the college years can be a critical period for developing adults' lifelong reading skills and habits. However, to the extent that students enter college with good reading skills, the more likely it is that they will benefit from their college experiences in regards to their reading and other literacy practices.

The Mature Adult Reader. One of the most ambitious investigations of adults' reading skills was undertaken in the late 1940s by Gray and Rogers (1956) who asked, what is the nature of the *skills, interests, and attitudes* that enable adults to effectively meet the reading demands in their lives? They identified 18 criteria for maturity in reading, and developed 16 scales to assess these maturity criteria. Collectively, the scales covered three broad areas, including interest in and purposes for reading, the complexity of the reading materials, and the individual's reading competence.

Gray and Rogers (1956) described several characteristics of mature readers, including enthusiasm, reading for four or more hours daily and in multiple interest areas, having broad and deep interests that include intellectually challenging text materials, reading for multiple purposes, and having inferential and critical reading skills, and the ability to apply ideas acquired from texts. These characteristics include cognitive, affective and

motivational dimensions and encompass the kinds of reading practices in which mature readers engage (i.e., reading for extended time periods).

They conducted three studies with adults from diverse educational and occupational backgrounds to assess levels of reading maturity. The first study was a pilot investigation to develop and refine the measures used to assess reading maturity. The study participants were volunteers and all were employees of a local department store. They were observed while reading, interviewed about their reading practices, and given multiple measures of reading maturity. Participants were asked to read and respond to texts of various sorts, including newsmagazine articles. They were then asked questions such as, “What does the article say?,” “What is your immediate reaction?,” and “Where does this fit in with your own ideas?” The purpose of these questions was to assess participants’ comprehension, ability to integrate new information with prior knowledge, and their facility in evaluating text information. High levels of reading maturity were not found among the participants in this study, however. In fact, most adults demonstrated only a few of the characteristics of reading maturity.

Because Gray and Rogers (1956) failed to find exemplary cases of reading maturity within their department store sample, they then turned to a highly select sample of 21 adults who were reputed to be accomplished readers, based upon peer nomination. The methodology was much the same as in the department store study, with some minor modifications necessary due to time constraints. Overall, Gray and Rogers determined that maturity is domain-specific (i.e., pertaining to only one topic or content area), and that persons may be mature in one aspect of reading (e.g., reading competence) but immature in another (e.g., amount of time spent in reading).

Although no follow-up work was ever conducted in this vein, Gray and Rogers’ ideas were confirmed in later studies of adult reading (Lundeberg, 1987; Pressley & Afflerbach, 1995), in which adults were observed to demonstrate expert reading skills in textual domains where they had sufficient prior knowledge, but evidenced rather poor comprehension skills when reading texts on topics with which they were unfamiliar. Gray and Rogers (1956) also noted individual differences in reading maturity and claimed that each adult reader is distinctive, having a mix of interests, skills, reading demands, and attitudes toward reading. They asserted that the social context, including educational attainment and interests, plays a significant role in the development of reading maturity—a perspective which gained prominence in educational psychology with the rediscovery of the work of Vygotsky (Rogoff, 1990; Rogoff & Lave, 1984; Scribner & Cole, 1981) and the emergence of socioconstructivist pedagogy (Edwards, 2001). The outcomes of Gray and Rogers’ research suggest that reading maturity takes a long time to develop, requires appropriate social supports and educational experiences, and is relatively rare. These conclusions are consistent with modern perspectives on life-span cognitive development (Baltes, 1987) and the growth of domain expertise (Ericsson & Charness, 1994).

Developing Reading Expertise. More recently, Alexander (2006) has proposed a life-span developmental model of reading that draws upon her Model of Domain Learning (MDL; Alexander, 1997) to account for changes in the “path to competence” as a reader. The model is based on research in expertise, and describes the significant roles of learner knowledge, topic interest, and strategic skills across three stages of reading development: acclimation, competence, and proficiency/expertise. As individuals’ develop domain knowledge about reading (as a specific skill) and topic knowledge about a variety of

subject matters, these forms of knowledge are, according to Alexander, increasingly interconnected.

Educators have long understood the importance of learners' interest to learning (Dewey, 1895; Schiefele, 1991). According to Alexander's model (1997), individual interest becomes increasingly important as the reader advances towards competence. Individual interest is described as the individual's long-term investment and involvement in the topic or domain. In contrast, situational interest—described as temporary attention to a topic or domain (and which is important to developing early reading skills)—plays a less important role in reading development.

A third essential component of the Alexander model of reading development is strategic processing, that is, readers' uses of surface- and deep-level processing strategies. While behaviors such as re-reading, varying one's reading rate, and skipping over unfamiliar words are examples of surface-level strategies, cross-text comparisons and questioning the veracity of a text source are deep processing strategies, according to Alexander (1997). It is these deep processes strategies which become more apparent among competent and proficient, or expert readers.

Alexander's Model of Domain Learning characterizes reading in three stages of development—acclimation, competence, and proficiency/expertise—in which aspects of readers' knowledge, interest, and strategic processing become increasingly interrelated. Acclimation occurs early in reading development. Young children possess little domain knowledge about reading and only some topic knowledge (e.g., about dogs, video games, or Pokeman). Illiterate adults who are learning to read, in contrast, may have much topical knowledge as a result of life experiences but, like young children, have little domain knowledge about reading. For example, adult learners often believe that reading means sounding out words, or that words cannot be skipped over when reading (Meyer & Keefe, 1985).

The strategic skills of acclimating readers are surface level rather than deep, and it is through exposure to a variety of texts which exert different reading demands that they can develop deep processing strategies. Acclimating readers may also benefit from specific instruction in the uses of deep processing strategies. According to Alexander, acclimating readers need situationally interesting learning environments which promote reading activity and further serve to nurture the growth of individual interest. Regardless of age, these developing readers need to be exposed to texts that capture their attention and help them to develop specific and enduring interests.

Competent readers have more domain and topic knowledge and their knowledge is more interconnected and cohesive, according to Alexander (1997). As their knowledge of reading increases, they are more efficient and effective in their strategy uses. Competent readers are also driven to read by individual interests more so than by situational interests. Competent readers are more likely to read on their own initiative rather than in response to reading assignments.

Finally, proficient/expert readers possess broad and deep knowledge of reading as well as any of a variety of topic areas (e.g., mathematics, the Civil War, the stock market). Individual interest is high among experts—contributing to the expansion and refinement of their expertise—and they are less reliant upon situational interest to drive their reading activities. Further, learning strategy uses are at a high level and generally consist of deep processing strategies.

Alexander further describes six profiles of readers that include highly competent, knowledge-reliant, seriously challenged, and resistant readers. Effortful and nonstrategic processors round out the six profiles. The profiles may be of particular value for educators

in that they suggest different instructional approaches that can be adopted to develop, encourage, and support students' reading skills. Highly competent readers are engaged and active readers who possess a rich repertoire of strategies—both surface-level and deep processing—and who have principled knowledge about reading and a strong base of world knowledge. Further, they display both interest in reading and in the topics that they read about. Knowledge-reliant readers draw upon what they know to support their reading performance, although they lack expert knowledge of reading itself. They are challenged by novel and highly-demanding reading tasks. Effortful processors are goal-directed and generally do well at most reading tasks. They are also strategic readers who can employ appropriate strategies to comprehend texts, although reading is not easy for them. Nonstrategic processors are, as the term suggests, those who use few or inappropriate strategies for comprehending text information. Further, they often fail to understand the demands of different reading tasks and are not good at judging their reading skills. Resistant readers possess the knowledge and strategic skills to become proficient readers but they lack the desire to do so. There are many adults who are quite capable of reading well, but they think of reading as “boring,” and find ways to avoid it. Such individuals have been referred to as *aliterates* (Thimmesch, 1984). Aliterate individuals often prefer to “learn by doing” rather than by reading.

Finally, seriously challenged readers have one or more language-processing difficulties, lack sufficient prior knowledge, possess few relevant strategies, and—likely due to these problems—may be unmotivated to read. According to Alexander, such readers require the most intensive level of instruction, without which, they will fail to progress beyond the initial acclimation phase. Alexander's approach to understanding how reading skills develop over the life span is a rich, dynamic, and instructive model that has important implications for reading pedagogy and adult literacy instruction.

The Effects of Reading on Adults

Adult readers, regardless of their level of reading skill, may obtain many benefits from reading. Both Krashen (1993) and Stanovich (2000) have made strong claims about the positive effects of reading on intellectual abilities, for example. Krashen (1993) summarized a number of studies that have demonstrated positive associations between reading activities and a variety of cognitive skills, including reading comprehension, vocabulary development, spelling, writing, grammar development, and oral language. Of course, correlational evidence is not sufficient to demonstrate that reading activity does, in fact, improve intellectual functioning.

Keith Stanovich and his colleagues, however, have provided stronger evidence that reading does strongly contribute to making readers “smarter” in the sense of having more knowledge and possessing larger vocabularies. Stanovich et al. conducted a series of investigations with children, adolescents, and adults that have consistently confirmed the contribution of reading to intellectual development (Cunningham & Stanovich, 1991, 1993; Cunningham, Stanovich, & Wilson, 1993; Cipelewski & Stanovich, 1992; Stanovich, 1993; Stanovich & Cunningham, 1992, 1993; Stanovich, Cunningham, & West, 1998; Stanovich, West, & Harrison, 1995; West et al., 1993).

Stanovich et al. employed a clever methodology to determine individuals' exposure to print. They speculated that individuals who are exposed to a large amount of print (i.e., those who read widely) would be more likely to recognize the names of authors, book and magazine titles, and the names of major metropolitan newspapers (e.g., *Chicago Tribune*), and would recognize more vocabulary words, than would individuals who do

not read much. They devised a series of simple recognition tests to distinguish between those persons having high and low print exposure. A checklist-with-foils protocol was used in which both real and fictional names were included for the author, newspaper, magazine, and book recognition tasks, and real and made-up words for the vocabulary recognition task. Stanovich et al. proposed that children, teens, and adults who read are much more likely to correctly identify real authors, actual newspapers and magazine names, book titles, and vocabulary words, and less likely to choose fictional names and titles, and non-words, as compared to nonreaders. Of course, nonreaders may indirectly learn about authors and books through TV viewing and films. Thus, similar recognition tests for television programs, character names, and movie titles were also used as controls for general cultural knowledge.

Print exposure, as determined by participants' scores on the author, book, newspaper, and magazine recognition tests, was significantly associated with reading comprehension, word decoding ability, spelling, word fluency, vocabulary, and abstract reasoning abilities across several samples of children, college students, and adults. While these findings do not identify the causative factors in cognitive development, the converging evidence from these studies points to the important role of reading experience (i.e., practice) in intellectual performance, according to Stanovich (2000). Thus, reading and reading practice truly does make one smarter. This work also demonstrates that exposure to print, through reading activity, is significantly related to reading ability. Thus, as adults are motivated to read and engage in reading, they consequently improve their reading abilities—illustrative of a kind of practice effect (see also Smith, 1996).

Guthrie and Greaney (1991) also noted that those persons who are active users of literacy are more knowledgeable than those who do not use literacy. Reading gives access to many information sources and types that can inform and assist people in their daily lives—at home and in the workplace and within the broader community. The acquisition of information through reading occurs over and above that which is gained through television and radio.

Reading can also be an important activity for personal empowerment. For example, Pitts (2004) conducted a content analysis of personal web pages that were created by women who were ill with breast cancer. These women used the vast resources of the Internet to read about medical findings, acquire knowledge about different treatment regimes, and share what they had learned by posting information on their web pages for others. They also read about the experiences of other breast cancer patients. In doing so, the women felt empowered to take control of their treatments, asked informed questions of their physicians, and explored issues regarding the potential disfiguring of their bodies and how mastectomy impacted their feelings about their femininity and sexuality.

Reading ability also pays some important benefits in the workplace in terms of one's occupational effectiveness. Generally, literacy researchers perceive reading at work as distinct from the kinds of reading done for school, or within the home or community. The principle distinctions have to do with the purpose for reading and the kinds of materials that are consumed. Reading demands vary by occupation, and higher status workers, managers and professionals tend to do more reading, and read a greater variety of materials, than do lower status workers, hourly employees, and unskilled laborers (Kirsch & Guthrie, 1984). This distinction is what Brandt (2001) called "stratified literacy" (p. 184). Sticht (1975) described two primary types of reading that take place at work: reading to do and reading to learn. These can be distinguished by occupational status. Blue-collar

workers tend to read in order to locate information that helps them accomplish specific tasks; professionals, on the other, hand do more reading for the sake of acquiring new knowledge, solve problems, and evaluate people, products, and processes.

Reading may have a positive impact on adults' civic awareness and participation in society. Venezky, Kaplan, and Yu (1998) found in an analysis of the NALS data that those adults who reported reading more text materials (e.g., newspapers, books) were more likely to have voted than those who read fewer materials. Similar results have been observed in media use studies (Stamm & Fortini-Campbell, 1983). Emig (1995), for example, found in a survey of adults in one southern community that 69.7 percent of those who reported reading newspapers "a lot" also reported that they had voted in the last local election. While it is impossible to discern cause and effect based on cross-sectional and self-report survey data, it seems obvious that people who are inclined to vote may read in order to stay informed and sample a variety of points of view. People who read a lot are likely to be informed about the political and social issues that they find important and may, therefore, be influenced to vote in regards to these issues.

Reading may also contribute to individuals' emotional well-being. Reading has been prescribed by mental health experts, for example, as an adjunct to therapy or as the therapeutic intervention itself. Such prescriptive reading is assumed to give help seekers opportunities to learn about and relate to the experiences of others, as reading others' stories may be a catalyst for change, or provide readers with different perspectives, opinions, and options. Thus, bibliotherapy has been used to treat problems ranging from alcoholism and depression to weight loss. Although some experts have questioned the validity of bibliotherapy (Rosen, 1987), the use of reading to address certain emotional and behavioral problems appears to be moderately effective (Marrs, 1995).

Books Influence Lives. In a somewhat different vein, Emery and Csikszentmihalyi (1981) demonstrated the powerful impact that book reading can have in socializing individuals and helping to set the course of their lives. They interviewed and compared 30 men who were carefully matched in terms of demographic (i.e., age, religion) and social background factors present when they were children (i.e., parents' education, disruptions in family life such as death of a parent). All were from working-class backgrounds, but 15 grew up to become university professors, while the other 15 grew up to remain in working-class, blue-collar occupations (e.g., furnace repair). Emery and Csikszentmihalyi found that the 15 men who became professors reported having books in their homes, were encouraged to read, had read extra materials beyond those required by school, and were able to identify one or more books that had a profound impact during their early lives. The men who remained in working-class jobs did not have books in their childhood homes, were not encouraged to read and rarely did so. Few could identify a book that was significant to them.

Emery and Csikszentmihalyi (1981) argued that the significant childhood books were those that provided answers to the critical problems in the individuals' lives (e.g., poverty and deprivation, homelessness, and loss), helped with identity formation processes, put their personal problems into a proper context and led them to better understanding of these issues, and offered them solutions to their problems. Thus, in the case of the 15 men who had experienced upward social mobility and improved economic status, book reading was profoundly significant to their individual development. Book reading enabled and encouraged them to use their minds, as opposed to their bodies, as the principal manner of interacting and coping with their environments.

Adults' Motivation for Reading

All of the available evidence shows that reading is a good habit to develop. Yet, it is well-established that people do not always do things that are good for them. As noted previously in this chapter, some people have the ability to read, but avoid doing so. What is it, then, that compels or motivates people to read? What are the key components of motivation for reading? What are benefits that adults accrue from their reading activities?

Compulsion to Read. People read for many reasons, of course. Some reasons are self-determined, arising from individuals' personal and professional goals. Other reasons may be prescribed or assigned by others, such as for a school- or work-related assignment. Self-determined reading frequently involves leisure reading materials, such as novels or popular magazines (Guthrie & Greaney, 1991). It is common for leisure readers to say that they find the reading experiences so pleasurable and rewarding that they often get "lost in a book" (Nell, 1988). Some readers become so absorbed in reading that the activity is actually physiologically arousing and results in a kind of trance-like state, according to Nell. He referred to such individuals as *ludic* readers. When reading for pleasure, the reader's attention is often sharply focused, and they can become so deeply absorbed that all sense of time is lost. Typically, ludic readers report having little self-consciousness yet they still feel in control of their actions. Csikszentmihalyi (1991) referred to such mental states as *flow*: "the state in which people are so involved in an activity that nothing else seems to matter" (p. 4).

While flow can be achieved during the course of many kinds of physical activities (i.e., running, mountain climbing), reading has been found to be the most common activity in which individuals report flow experiences. Readers who find particular topics highly interesting may experience flow while reading about them (Schiefele, 1991). Csikszentmihalyi views flow as a highly desirable condition which can potentially lead to personal happiness, life satisfaction, and intrinsic motivation (i.e., engaging in an activity for its own sake). Thus, as many avid readers have noted, reading has many positive psychological benefits (Birkerts, 1994). Equally important to the task of teaching reading skills in the early grades (and in ABE programs) is finding ways to increase students' desire to read for pleasure and to achieve other purposes in their lives.

A Motivation Model. Thus, motivation is a significant variable in developing and sustaining reading skills and practices across the life span (Alexander, 2006; Guthrie & Wigfield, 2000). Although Gray and Rogers (1956) did not identify motivation specifically, they recognized that mature readers were self-directed and needed little prompting from others to engage in reading. Mature readers recognize the value of reading as both an intellectual and pleasurable activity. More recently, Guthrie and Wigfield (1999) have developed a motivational-cognitive model of reading, and have defined reading motivation as "the individual's goals and beliefs with regard to reading" (p. 199). They further describe several motivational processes in regards to readers' *task mastery goals* (i.e., the reader's intentions for a given reader-text interaction), *intrinsic motivation* (i.e., reading for its own sake), *self-efficacy* (i.e., the reader's sense that he or she can read effectively), *personal interest* (i.e., valuing the topics contained within texts), and *transactional beliefs* (i.e., the reader's belief that meaning exists in the mind of the reader and must be actively constructed from the text; Schraw & Bruning, 1999). Adults having high transactional beliefs "are convinced that their knowledge, values, and personal idiosyncrasies are relevant" to understanding texts, according to Guthrie & Wigfield (1999, p. 201).

Wigfield and Guthrie (1995, 1997) found motivation to predict amount of reading among school-age children. After controlling for prior reading activity and intrinsic motivation levels, intrinsic motivation for reading (i.e., reading for its own sake) accounted for 15 percent of the variance in amount of reading students reported, and significantly predicted growth in the amount of reading from fourth to fifth grade. Low self-efficacy (Quigley, 1997), fear of failure, and embarrassment about one's skills (and about one's choices of reading materials; see Cuban, 2001) appear to be variables that diminish motivation for reading and thereby impede reading development among low-literate adults (Linnenbrink & Pintrich, 2003; Ziegler, Bain, Bell, McCallum, & Brian, 2006). Literacy educators should therefore strive to minimize the conditions which might lead to students' feelings of embarrassment or having few success experiences.

Summary

Although the development of reading skills has not been traced over the life span, reading researchers recognize that reading behaviors and the cognitive skills that influence reading undergo significant changes. During college—when young adults are confronted with substantial reading demands—lifelong reading skills and habits may be established. Expert readers possess the requisite skills, interests, and attitudes, and the strategic skills that enable them to comprehend, enjoy, and make use of the text materials they read. There is compelling evidence that reading contributes to making adults smarter insofar that those having greater exposure to and experience with a variety of print sources learn more topic knowledge and acquire larger vocabularies. Reading provides other benefits as well, including personal empowerment and emotional well-being, effectiveness in performing one's job, and being informed about and involved in community life.

Writing

According to the National Commission on Writing (2004), “[w]riting consists of the ability to say things correctly, to say them well, and to say them in a way that makes sense (i.e., grammar, rhetoric, and logic)” (p. 19). Walter Ong observed that writing is necessary to help the human mind achieve its full potential (1982). Given its obvious importance in human communication and in contributing to the intellectual lives of adults, it is rather surprising that, as Brandt (2001) has noted, the study of writing as a literacy practice has been “virtually invisible” (p. 13) in both educational and communications studies. Somewhat more prominent are the numerous investigations of students' composition skills and the development of models that depict the cognitive processes involved in crafting written work to meet academic demands (Bereiter & Scardamalia, 1987; Flower & Hayes, 1977, 1984; Kellogg, 1994).

Brandt (2001), in describing the long historical and cultural divide between reading and writing, notes that writing is less valued than is reading, as writing practices tend to be “embedded in mundane work” (p. 167). However, writing is now overtaking reading as a fundamental, basic literacy skill because writing both documents and comprises the work that many people do. As such, writing is often responsible for activating reading, according to Brandt. Despite this recent shift in the reading-writing relationship, writing remains secondary to reading within the school curriculum. For example, nearly all public grade schools employ reading specialists, yet few—if any—have writing specialists who help children learn to write well. In general, it is expected that *all* teachers should become writing teachers, and writing-across-the-curriculum is increasingly being

practiced in U.S. elementary, middle, and high schools (Brewster & Klump, 2004). This approach may, however, only diminish rather than elevate writing's status in school.

In interviews with 80 individuals who were born at different times from the late 19th to late 20th centuries, Brandt (2001) found that they reported generally vivid, pleasurable experiences regarding their first efforts at reading. In contrast, memories of first writing attempts were much more ambiguous events. These were recalled as humiliating and anxiety-producing experiences. Given such circumstances, it is little wonder that few individual—aside from those who enact the role as professionals—develop an identity as a writer. This may be due to writing's ambiguity as a literate activity and its role in daily activities such as bill-paying, grocery lists, and work.

The result of this ambiguity about writing's role as a central literacy practice is that we know very little about the impacts of writing on adults' learning and development. Krashen (1993) claims, however, that writing contributes to cognitive development in much the same manner as does reading. Writing allows the writer to concretize their abstract thoughts and ideas, for example. "Writing is how students connect the dots in their knowledge," according to the National Commission on Writing in America's Schools and Colleges (2003, p. 3). In contrast to Brandt, the National Commission on Writing claims that writing has a central role in everyday life, sustaining both popular culture and western economies, through the production of artifacts such as best-selling books, feature films, inspirational works, instructional manuals, and political campaign materials. Whenever writing is discussed, however, it is typically focused around the creative and productive activities of professional writers—novelists, poets, essayists, and journalists—rather than the behaviors of adults who can and do write—letters, shopping lists, notes to their children's teachers, brief memos at work—but do not consider themselves to be "writers."

Barton and Padmore (1991) found that the English adults interviewed in an extensive study of everyday literacy practices established regular times and created a specific place in their homes for writing. Some were daily diarists, while others were regular letter writers—sending correspondence to friends and family members. Barton and Padmore noted that each person had their own set of writing practices, an important finding which cautions against making broad generalizations about adults' literacy practices.

Nonetheless, adults' opportunities for writing in daily life appear to be not as prevalent as for reading. When writing occurs, it is often in response to environmental demands, rather than enacted out of a desire for leisure. Further, little is known about the condition of adults' writing skills. No large-scale studies of adults' writing abilities have been conducted since 1969 (National Assessment of Educational Progress, 1970). That survey, called the *National Assessment of Writing*, compared the writing abilities of 17-year-old students and adults ages 26 to 35. Across several different types of writing tasks, the percentage of adults whose writing was judged "acceptable" ranged from 38 percent to 57 percent.

In 2002, the National Assessment of Education Progress, administered by the National Center for Education Statistics, assessed the writing skills of 19,000 U.S. high school students (i.e., 12th graders). Students were asked to write three types of documents: narrative, informative, and persuasive. Each student was given two 25-minute writing tasks and they were encouraged to edit and revise their written work. More than one-fourth (26%) of 12th grade students were below basic proficiency, but slightly more than one-half (51%) were at the basic proficiency level, indicating partial mastery of writing skills. Only about one-quarter (24%) of students were judged to be proficient or advanced in their writing abilities. Overall, the results for 12th graders were unchanged

from the 1998 assessment, indicating that U.S. public schools must increase their efforts to improve students' writing skills (U.S. Department of Education, 2002).

What do Adults Write? Social commentators fret frequently about the disappearance of letter writing as a cultural activity due to the near-universal access to cell phones and Email (Ivask, 1990; Kauvar, 1995; Risen, 2005). Email letters tend to be briefer and thus more telegraphic in nature, but more immediate (Baron, 1998). The Pew Internet and American Life Project found that, on a typical day, 58 percent of American adults use the Internet for writing and reading email (Rainie & Horrigan, 2005), attesting to the popularity of this form of written communication. There are few studies evaluating the quality of adults' email writing, but email messages tend to be brief, and writers frequently employ abbreviations such as LOL ("laughing out loud") and symbolized emoticons to convey emotion or tone in an electronic message, such as the sideways smiley face, :-).

Another form of writing that continues to grow in popularity is the online diary or weblog—also known as a "blog." These online journals, on popular web service providers, may be either public or private, depending upon the writer's preference. Individuals who update their blogs on a regular—often daily—basis are referred to as bloggers. Blogging has rapidly evolved into an intriguing mix of personal confession and public journalism. While most bloggers write about their personal experiences, often commenting upon ordinary aspects of their lives, a significant minority address political and social issues in their blogs (Pew Internet & American Life Project, 2006). Thus, for the first time in history, the writing of common folk is being mass distributed—and very quickly.

Some estimates suggest that as many as a half-million weblogs are actively maintained by bloggers (Manjo, 2002). Most bloggers are young (under age 30) and a significant portion (40%) are non-White (Pew Internet & American Life Project, 2006). Many professional writers and journalists are writing blogs, either in connection with the newspapers and magazines by whom they are employed, or independently. Because this is a relatively new medium for writing, few studies have investigated the degree to which such writing activity may be beneficial to improving adults' writing skills or other literacy proficiencies. However, the Pew Internet & American Life Project survey of bloggers found that more than half (52%) indicated that they blog to express themselves creatively—suggesting that blogging may indeed bestow benefits to adults' skills.

Writing at Work. Surveys show that employers place a high value on employees' writing skills, and writing is considered to be a threshold skill for hiring and promotion among salaried employees (National Commission on Writing, 2004). Yet, relatively few contemporary studies exist regarding the demands for writing in the workplace or of employees' writing competence. Aldrich (1979) surveyed 254 business employees in middle management positions who were responsible for writing substantive document materials. These managers reported that they experienced two basic kinds of writing problems. They first lacked knowledge about how to adequately prepare for writing tasks, and, second, they therefore had negative feelings about writing.

Faigley and Miller (1982) surveyed 200 college-educated adults about their work related writing to determine how much time people spent writing and the kinds of workplace writing tasks required. Participants were administrators and managers in professional and technical occupations, or worked in sales and clerical positions, were employed in crafts and trades, or were blue-collar and service-industry workers. On average, nearly one-quarter (23%) of their time at work was devoted to writing, according to

the respondents. This figure varied across occupations: blue-collar workers, for example, wrote for only about 4 percent of their total work time.

The written documents produced by the respondents included letters, memos, reports, and notes for presentations. Workers produced a weekly average of seven different types of documents. These documents were often written collaboratively with other persons—about 25 percent of the time. Respondents reported doing little writing outside of their jobs. Letters and journaling were very infrequent, for example. Only 1 percent of respondents wrote in a daily journal. This study was conducted, however, before the advent of email and the widespread introduction of personal computers into the workplace and home. There is some evidence to suggest that the growth of email has led to a rebirth of writing, of sorts, among adults. Brief letters and notes to family, friends, and acquaintances are much more frequent (The Pew Research Center for The People and The Press, 1999) and appear to be increasing (Bakardjieva & Smith, 2001). It is likely that much of this kind of writing is ordinary and unsophisticated and meant simply to convey information, news, or greetings rather than to present an opposing side to an argument, or to persuade or enlighten the recipient. Thus, there is little to suggest that such writing activities have any pronounced cognitive benefits. Yet, certain kinds of writing may indeed produce intellectual and emotional benefits for adults.

Benefits of Writing. It has frequently been observed that writing about bothersome things can be beneficial to the writer. Pennebaker (1997), for example, has conducted an extensive program of research demonstrating that writing about emotional upheavals can improve adults' physical and mental health. Across a series of investigations, individuals who were asked to write about their deepest thoughts and feelings regarding important personal emotional issues (without concern that their writing skills would be evaluated) demonstrated a number of benefits. These included reductions in the number of visits to a physician (Pennebaker, Barger, & Tiebout, 1989), improved immune system functioning (Pennebaker, Kiecolt-Glaser, & Glaser, 1988), improvements in academic performance (Pennebaker, Colder, & Sharp, 1990), decreased work absenteeism (Francis & Pennebaker, 1992), and relief from physical symptoms (Pennebaker & Beall, 1986). Writing appears to be equally profitable as talking about emotional issues for improving mental and physical well-being. Further, writing about such issues has been found to have equivalent benefits for young and old as well as for men and women (Pennebaker, 1997).

Klein and Boals (2001) have shown that writing has important effects on cognitive processes. For example, when adults write about important matters in life, such activity leads to improved memory performance. Klein found that freshman college students who were assigned to write about their thoughts and feelings in regards to college life improved their working memory ability as compared to students who wrote about trivial topics. In a subsequent study, students who wrote about negative life experiences improved their working memory compared to students who wrote about either positive experiences or trivial events. Lepore and Smyth (2002) suggest that expressive writing reduces both intrusive thoughts and avoidant thinking about stressful experiences, thus reducing working memory demands. Intrusive thoughts and one's attempts to suppress these thoughts impair problem-solving to the extent that proactive coping in response to life stressors becomes much less likely to occur. This leads to increased stress which, in turn, causes more emotional distress for the individual. Expressive writing is thus a relatively simple and inexpensive way of improving one's mental health.

As noted above, writing is also beneficial for alleviating chronic physical symptoms.

Smyth, Stone, Hurewitz, and Kaell (1999) studied patients with asthma or rheumatoid arthritis who were assigned to write about either the most stressful event of their lives (treatment group) or emotionally neutral topics (control group). At a four month follow-up, asthma patients in the treatment group showed improvements in lung function, while control group patients evidenced no change. Rheumatoid arthritis patients in the treatment group showed improvements in overall disease activity, but controls did not change. The observed improvements were beyond those that could be attributed to the standard medical care that all participants received.

In sum, writing is an under-studied, even somewhat ambiguous, dimension of adult literacy—even though it is increasingly important in adult life. Most writing research has focused on the composition skills of students who are writing for academic purposes. No large-scale evaluations of American adults' writing skills have been conducted in more than a generation, and little is known about the impacts of writing on adults' development. The advent of new technologies has perhaps increased adults' propensity to write, but not necessarily to produce extended prose or narratives. While writing is considered essential in the workplace, more research is needed to understand the scope of workplace writing demands and workers' writing proficiencies. Writing appears to have intellectual, physical, and emotional benefits for adults when they write about difficult life situations or emotion-laden topics.

Numeracy

A third dimension of literacy ability that has received somewhat less attention is numeracy, or quantitative literacy proficiency. Numeracy is a broad concept that encompasses the cultural, social, and functional dimensions of mathematics (Withnall 1995). It is defined as the “skills, knowledge, beliefs, patterns of thinking, and related communicative and problem-solving processes individuals need to effectively interpret and handle real-world quantitative situations, problems, and tasks” (Office of Vocational and Adult Education, 1994, n.p.). More specifically, numeracy consists of the math skills that are needed to function effectively in the workplace and in the other contexts of adults' lives (Gal & Schuh, 1995; Schmitt, 2000). Everyday activities such as balancing a checkbook, calculating the amount of interest paid on a five-year loan, measuring quantities for a recipe, or estimating the length of a board are examples of numeracy tasks. As with reading and writing, adults' numeracy skills are not all or nothing, but fall along a range of abilities which vary among individuals across different kinds of mathematical tasks and problems. The proliferation of technology into all aspects of people's lives has made numeracy equally important as reading and writing for work, family and community life, and civic participation (Moses, 2003). Many everyday activities require people to estimate quantities, magnitudes, or the conditions of things (Sanfey & Hastie, 2000).

The 1992 NALS assessed adults' numeracy abilities (operationalized as quantitative literacy proficiency) by measuring their skills in applying arithmetic operations, either alone or sequentially, using numbers embedded in printed materials (Kirsch et al., 1993, pp. 3–4). Examples of the quantitative literacy tasks on the NALS included the following:

- determining which flight an individual should take to arrive in time to attend a meeting
- calculating the cost per ounce of a jar of peanut butter
- adding shipping and handling charges and then computing the total costs of a purchase on a catalog order form.

Overall, only about 4 percent of U.S. adults performed at the highest proficiency level. Similar tasks were used for the 2003 NAAL survey of adult literacy. Adults' quantitative literacy skills were found to have little changed since 1992. The percentage of adults with below basic quantitative literacy skills decreased by four percentage points, while the percentage of those having "intermediate" proficiency increased by only three percentage points in that time span (National Center for Education Statistics, 2006).

Why do some adults' quantitative literacy skills appear to be inadequate? Ineffective math instruction in school appears to be one culprit (Kahne, Bridge, & O'Brien, 2002), in part due to the lack of satisfactory preparation and credentialing of mathematics teachers. In California, for example, fully 1 in 5 high school math teachers is unprepared or is teaching out of field according to the Center for the Future of Teaching & Learning (2005). Decades of math curriculum reform in public schools across the United States has not resulted in the kinds of achievement gains for K-12 students that are desired. Trend data from the National Assessment of Educational Progress show that while mathematics achievement has statistically significantly increased over the past 30 years (1973–2004) for nine- and 13-year-olds, scores have remained flat for 17-year olds, with no meaningful improvement in high schoolers' scores over three decades (Nation's Report Card, 2004).

Many adults lack confidence in their numeracy abilities. Adults often report feeling anxious about having to perform mathematical tasks, in part because math is associated with unpleasant activities such as paying bills. Math anxiety refers to the feelings of tension, apprehension, or fear that interfere with the manipulation of numbers and the ability to solve numeracy problems in everyday life and academic situations (Tobias, 1993). Math anxiety can contribute to forgetting even obvious solutions to math problems and may lead to a loss of self-confidence in one's abilities to perform numeracy tasks successfully. Unfortunately, few studies of math anxiety and its role in impeding adults' quantitative literacy performance have been conducted. Some educators (Mathison, 1979) have suggested that math anxiety support groups and tutors can be helpful for adults who experience anxiety with numeracy tasks.

Technology Literacy

Some scholars have argued that proficiency with technology (e.g., being able to use a computer to "surf" the Internet, making a withdrawal from a cash machine, programming a VCR) is yet another form of literacy. Certainly, literacy tasks and skills are imbedded in the uses of technology. The student seeking information on the Internet must be able to read and interpret the information contained on the web site, for example. A person withdrawing cash from an ATM needs to be able to count to determine if the correct amount was dispensed. Certainly, anyone who has ever tried to program a VCR using the instruction manual must have high tolerance for ambiguity as the written instructions are often vague or full of technical jargon. Because modern life is imbued with all manner of technology, it is essential that adults are able to employ these tools in ways that are beneficial.

Rapid advances in computer and communications technologies over the past decade have contributed to remarkable social and cultural changes, and arcane terminology once used only among computer programmers and software designers has entered the daily lexicon (e.g., "log on," "bandwidth," and "download," to cite but a few). Today, for example, television commercials and print advertisements for consumer products frequently include an Internet address for the company's web site. Clearly, advertisers

understand how computers have become an integral part of many people's lives. The Internet has contributed to a world that has grown, in a sense, much smaller, as events happening on the other side of the world can be widely reported by observers and journalists nearly in synchrony with their occurrence. As computer technology has been infused into many different cultural institutions and activities, and blended with other technologies (e.g., television, radio, cell phones, portable music devices), researchers, policymakers, and social commentators have also become aware of a "digital divide" that distinguishes those persons who have ready access to the technology and those individuals who do not (U.S. Department of Commerce, 1999). The latter groups consist primarily of members of the economic underclass who cannot afford personal computers, do not use public libraries where computer access is free, and whose children attend schools that are not connected to the Internet. Working adults who lack sufficient education or training may be employed in jobs that do not require them to use computer technology (although such jobs appear to be quickly vanishing).

Although the digital world is a part of many people's lives today, very little is known about the extent to which adults engage in technology literacy practices on a day-to-day basis. A survey conducted by The Pew Research Center for The People and The Press (1999) found that nearly half (46%) of all Internet users had begun to use the Internet within the year prior to the survey (i.e., 1998). More than one-third of all adults (35%) used email, and 24 percent used email on a daily basis. Thirty percent of Americans were found to go on-line everyday. Among those adults having less than a high school education, however, only 4 percent go on-line everyday. Nearly 1 in 4 (24%) of these adults do not use the Internet.

More recently, the U.S. Census Bureau (2005) reported that 70 million U. S. households (62% of all U.S. households) had one or more computers as of October, 2003. More than half (55%) of all households had access to the Internet. Generally, if people have a computer, they have Internet access, as 88 percent of those with a home computer also have access to the Internet. It appears that the digital divide—to the extent that it exists—is more of a generational than an economic problem. That is, children are more likely to use computers than adults because they have access to computers at school or in public libraries. Sixty-four percent of adults 18 years of age and older use a computer at home, work, or at school. One technology use favoring adults is that they are slightly more likely to use the Internet (60% vs. 56%) than are children.

Two-thirds of adults have a computer at home and 83 percent of these adults use the computer. Eighty-two percent of adults who have Internet access at home utilize this access. Fifty-six percent of adults use a computer at work and 42 percent access the Internet while at work. Nearly 9 of 10 adult students (85%) use a computer at school, and two-thirds of them (66%) access the Internet at school. In regard to specific computing practices, 88 percent of adults use the Internet for email and 78 percent use the Internet to obtain information on products or services. More than half of all adults (55%) have sent an email or used instant messaging (IM). IM is popular among youth and is beginning to surpass email in terms of volume of use, according to a survey conducted by AOL (2004). It is obvious that, despite concerns about online security and identity theft, more American adults are feeling reasonably confident about conducting personal financial business online. Eighteen percent of adults conducted online banking in 2003, and one-third (32%) used the Internet to purchase a product or service, according to the 2005 Census Bureau report.

The adoption and uses of technology is not limited to the United States, of course. A survey of Internet use in Europe found that Europeans adults now spend more time

online than they do reading newspapers and magazines (BBC News, 2006). The average western European adult spends four hours per week online. As might be expected, younger adults (ages 15–24) are more likely to utilize the Internet than are older adults. The trend of greater online usage is firmly established and is but one example of the profound ways in which technology is changing adults' literacy practices.

Health Literacy. Maintaining good health for one's self and family members is a wise and beneficial practice in adulthood, and there is much evidence that literacy plays an important role in health maintenance. Low-literate adults, for example, may ignore instructions that are written at an advanced reading level. They may not seek out procedures that screen for health threats (e.g., mammograms; Davis, Arnold, Berkel, Nancy, Jackson, & Glass, 1996) because they are unable to comprehend insurance forms or other print materials. Rudd, Moeykens, and Colton (1999) state that

[p]atients' literacy directly influences their access to crucial information about their rights and their health care, whether it involves following instructions for care, taking medicine, comprehending disease-related information, or learning about disease prevention and health promotion. (p. 162)

They reviewed two decades of research in the health field that showed that health-related written materials (e.g., medicine labels and warnings; informed consent documents; post-surgical instructions; insurance forms) are complex and challenging for many adults. Such materials frequently contain medical terminology, scientific jargon, multisyllabic words, and complex sentences that are confusing to even average-ability readers. In a study of text materials (such as signs and brochures) found in hospitals, Anderson and Rudd (2006) observed that the reading level of these materials ranged from eighth grade to advanced graduate level. As Rudd (2002) has noted, however, professionals in health care are now recognizing the connection between literacy and health, and are working with educators to produce visually appealing health-related materials that are written so that they can be more easily read and understood by laypersons.

In sum, numeracy has garnered less attention than writing, although it is arguably as important as reading and writing, as many daily tasks require facility with numbers—including counting, measuring, and estimating things, and calculating amounts. Low quantitative proficiency is attributable, in part, to poor math instruction and low self-efficacy and high anxiety around math-related tasks. The infusion of technology has led to a new kind of literacy ability—technology literacy. Although the majority of U.S. adults use technologies such as personal computers, many perform relatively low-level tasks, such as sending email. Yet another dimension of literacy pertains to adults' abilities to navigate the health care system, and to read and understand health- and medical-related documents. This is a growing area of research.

Conclusion

This chapter has described adults' literacy in regards to the roles that literacy plays in adult life and the different forms that literacy takes and the diverse kinds of literacy practices in which adults may choose to participate. There has been historically little consensus regarding the definition of literacy, in terms of what it means to be a literate person. At least two distinct perspectives on literacy coexist. The psycholinguistic perspective, which emphasizes the development of cognitive skills, has largely predominated within

American psychology and education. The emphasis on mastery of the discrete skills that collectively contribute to literacy proficiency has had immense influence on reading instruction in schools, and has largely shaped the way in which people think about their reading skills and those of their children and others. Recent large-scale assessments of adults' literacy skills are based in this perspective. These assessments, such as the 2003 National Assessment of Adult Literacy, have shown that sizeable numbers of adults are lacking in their literacy abilities. In contrast, most adults report that they do not have deep concerns with their ability to accomplish everyday literacy tasks. Of course, some adults lack adequate literacy to be socially mobile in terms of getting and holding onto a better job, and they lack confidence in their abilities to assist their children with literacy tasks, or to participate fully in their communities. Often, these adults enroll in adult education programs that are designed to teach reading, writing, and basic math skills. Unfortunately, the available evidence suggests that these programs are not very effective in improving adults' skills. Other evidence has shown that adults who enroll in literacy education benefit in terms of enhanced self-esteem.

The social practices perspective, in contrast to the psycholinguistic model, argues that there are multiple literacies, of which school reading is but one. Literacy is largely determined and defined by the social context in which particular literacy abilities may be required, and pure cognitive skill for decoding texts is not a prerequisite to demonstrating literacy proficiency. Literacy may be enacted and demonstrated in multiple ways, in diverse environments, and can be accomplished in a number of ways. Four obvious dimensions of literacy are reading, writing, math (or numeracy), and using technology (which often involves uses the three preceding literacies in various combinations). Reading has been shown to contribute to adults' knowledge acquisition, in terms of world knowledge and vocabulary, and reading activities clearly return positive benefits for adults in school and out. For example, reading books has been shown to have important psychic and intellectual benefits to those who develop lifelong reading habits. Motivation is, of course, a key variable in reading. Reading is frequently a pleasurable activity for adults, which tends to lead to more reading.

Expressive writing, like reading, also appears to have important benefits to emotional health and well-being for adults. Writing has, however, been much less emphasized in school and researchers have not devoted much attention to studying adults' writing skills and practices. Some kinds of writing practices appear to be on the upswing, however, as the Internet has made it possible to easily and quickly express one's ideas in writing and within public forums, such as with the use of weblogs. While writing is required for many kinds of jobs, workers are not always confident in their workplace writing skills.

Despite decades of curricular reforms, the mathematics achievement of U.S. high school students has shown little improvement over the past 30 years. Quantitative literacy skills and the abilities to think about and use numbers (also known as numeracy) are essential in contemporary culture. Yet many adults, perhaps owing to their anxiety about school math, lack confidence in their numeracy skills. The uses of various kinds of technologies for work, play, and managing personal needs, family responsibilities, and social obligations, are deeply embedded in the everyday experiences of most adults. These technology uses represent another type of literacy practice that involves reading, writing, and numeracy.

The available evidence shows that literacy is beneficial to adults in advanced societies and contributes to adults' development in a number of important ways. People who participate in various literacy practices within and across different communities of practice have access to the knowledge and information that is necessary for personal growth

and health maintenance, occupational advancement, and the establishment of social networks.

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