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Adult Literacy: A Synthesis of Evidence

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Executive Summary

According to the latest *International Adult Literacy and Life Skills Survey, 2003 (IALLS),* (Statistics Canada and OECD, 2005), the literacy skills of Canadians are not improving significantly. According to the first edition of the *International Adult Literacy Survey, 1994*, slightly more than one-fifth of Canadians faced serious difficulties when addressing any form of printed material, and another quarter of the population struggled with all but the most elementary reading and writing tasks of daily life (Statistics Canada and OECD 1995, ABC Canada Literacy Foundation, 2001; CMEC, 1999). The average literacy score of adults has not changed markedly since these results were first obtained. Policy makers are concerned that low levels of adult literacy have a significant impact on the social and economic well-being of Canadians.

This report, a systematic synthesis of the evidence devoted to adult literacy instructional practices from 1985 to the present, is designed to provide guidance to decision makers about how the issue of adult literacy might be addressed. The review applied thorough and transparent procedures to the collection and analysis of evidence from research-oriented articles obtained from a search of eleven databases.

Most generalizations in educational research should be made with caution. In the field of adult literacy best practices this warning attains heightened salience. As Torgerson *et al.* (2003) observe, existing research is heterogeneous and of relatively low quality; therefore it is hard to suggest specific interventions. Moreover, there are no accepted standards for what constitutes program success (for example, how much improvement should be expected in what range of competencies over what period of time), making it difficult to suggest that a particular intervention leads to ‘success’ (Beder, 1999).

Nonetheless, we believe that there are a number of lessons one can draw from the studies reviewed for this synthesis, including, but not limited to, the following:

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1. Adults most in need of literacy intervention include: (a) adults who have not completed secondary school and who are not currently in school; (b) adults who have completed secondary school, but who have not pursued further education or training; and (c) adults with further education or training who are employed in the most rapidly declining sectors of the economy.
2. Assessment of each learner's actual abilities is of fundamental importance in determining which instructional practices are likely to yield the best results in terms of improving literacy.
3. Adults should be taught knowledge and skills that they can apply directly to their lives.
4. Adult learners should receive direct instruction about how to make time for learning, planning future learning, and learning meta-cognitive reading and writing strategies such as encouraging them to reflect on what they are doing to help themselves read effectively.
5. Instruction of adults should take into account their prior knowledge and their prior experience in school settings.
6. Phonological awareness (one's sensitivity to the sound structure of language; i.e., the ability to distinguish syllables and speech sounds) and skills development are necessary, but not sufficient, components of many adult literacy programs.
7. Computer assisted instruction appears beneficial for adult learners because it allows for individualization, immediate feedback, and privacy.
8. Programs should focus on reducing attrition and encouraging involvement until the program is completed.
9. Adults need realistic short term literacy goals to avoid disappointment, and active encouragement to continue literacy learning.
10. The assessment of the impact of adult literacy interventions should be carefully matched to the purposes of the program.

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Introduction

At the core of any informed discussion about best practices for adult literacy instruction is the need to first understand and frame the issues being addressed. The scope of adult literacy research is vast and the methods that have been used to study literacy development are varied, yielding results that are often difficult to compare.

We feel it is important to offer a brief discussion of some of the broad issues and concerns that frame adult literacy research, even though our own analysis was based on a review process with well-defined and stringent criteria that were not intended to address the full scope of adult literacy research.[1] For a number of reasons, many of which are outlined below, we recognize that the existing body of studies on adult literacy is not likely to provide definitive conclusions on the specific conditions and techniques that will lead to improvements in literacy competency for all adult learners. We also believe it is important to contrast our conclusions about best practices in adult literacy instruction against those factors and influences which, while falling outside the established scope of our analysis, have been revealed by research as likely to influence the acquisition and development of literacy among adult learners.

A first step is to examine how the field, and the definitions of literacy it has espoused, has evolved over the last decades. Any conclusions must also be taken in the context of the current state of adult literacy in Canada, and who the potential and actual literacy learners are. Finally, it is necessary to outline some major areas of consensus regarding adult literacy among researchers and practitioners even if these fall outside the defined scope of this analysis. These topics comprise the following section of this report.

[1] The limitations of our report, and the nature of the research that was reviewed in preparing our analysis, are outlined elsewhere.

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Framing the Issue

What do we mean by literacy?

> **[I]t is misleading to think of literacy in terms of consequences. What matters is what people do with literacy, not what literacy does to people. Literacy does not cause a new mode of thought, but having a written record may permit people to do something they could not do before ... Literacy is important for what it permits people to do—to achieve their goals or bring new goals into view.**

- David R. Olson (Olson, Torrance & Hildyard, 1985, p. 15).

In the realms of both theory and instructional practice, the concepts of literacy and literate competency have undergone dramatic change in the last half-century. Nonetheless, theory and instructional practice have not evolved in similar directions or at a similar pace. In fact, the social and economic values attached to literacy acquisition and development have often created marked divisions between advocates of specific instructional approaches, on the one hand, and academics who have examined literacy acquisition and development from a variety of perspectives, on the other. Particularly in the last two decades or so, investigations into the psychology and instruction of literacy have shed much needed light on some of the cognitive processes involved in developing the ability to read and write.[2] At the same time, researchers and educational practitioners have advocated for a conceptualization of literacy as a product of specific social and cultural forces. These individuals have sought to increase appreciation and understanding of literacy acquisition as both a cognitive and intellectual task, as well as one that can facilitate or impede full participation and engagement in society. Reflecting this evolution in perspectives of literacy, government policies and initiatives have increasingly adopted the position that high levels of literacy across and within groups are necessary instruments of economic growth, and that individual competency is an essential condition of democratic and civic participation.

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[2] Most of this work has focused on how children acquire literacy, with comparatively little research conducted on literacy acquisition and improvement in adult learners; although good examples of adult literacy acquisition research are provided by Bone, Cirino, Morris & Morris, 2002; Gottardo, Siegel, & Stanovich, 1997; Kruidener, 2002; and Perfetti & Marron, 1995.

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This difference in perspectives about the nature and meaning of being literate has produced some heated debates about the "best ways" to teach people literacy. This has been the case, in particular, for groups such as low-literacy adult learners whose limited literate competency has come to be seen as a contributor to their marginalization or disfranchisement from society. Yet, despite the polemics, a consensus is increasingly emerging around the need for a so-called "balanced approach" that recognizes literacy development as entailing both the *acquisition of specific skills and abilities*, and *the ability to participate in society through greater understanding and appreciation of various literacy applications and practices* (Cassidy, Brozo & Cassidy, 2000; Hannon, 2000; Hemphill & Snow, 1998; Pressley, 2002; Purcell-Gates, Jacobson & Degener, 2004; Sadoski, 2004; Trabasso & Bouchard, 2002; Wray, 1997).

A state of the field review of adult literacy research commissioned by the Canadian Council on Learning in fall 2005 supports the conclusion that different groups of decision-makers work with and from a variety of literacy definitions. International comparisons of adult literate competency have, for example, relied primarily on data yielded by the various editions of the International Adult Literacy Surveys (IALS), which have defined literacy as "the ability to understand and employ printed information in daily activities at home, at work and in the community—to achieve one's goals, and to develop one's knowledge and potential" (Quigley, Folinsbee & Kraglund-Gauthier, 2005, p. 8). According to this same review, a number of Canadian literacy organizations such as ABC CANADA, Literacy BC, Literacy Alberta, and Literacy Nova Scotia have conceptualized literacy in a manner similar to that found in the IALS and other large-scale comparison instruments and reports.

The review also found considerable variations across the country in terms of how literacy was defined, ranging from positions that frame literacy as "reading the world" and not just reading the word (see for example the Saskatchewan Literacy Network and the Ontario Literacy Coalition); as a way to understand culture and one's world; as a right (the NWT Literacy Council); as a cognitive and social act that is culturally defined and

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that varies from context to context (the Centre for Literacy in Quebec); and as a precondition for lifelong learning (Frontier College). Furthermore, the review highlighted a difference in perspectives on literacy among employers, business leaders and public decision-makers (whose interests in literacy often stem from concerns with productivity, economic development, and employability) and labour unions and community organizations (which frequently associate literacy with individual empowerment, broader civic participation and enhanced democracy).

The varied purposes and goals associated with literacy have been recognized by a number of Canadian organizations (e.g. CMEC, *Survey of Trends…).* The purpose of this section is not to explore these differences at length, but to underscore that these various perspectives can and often do result in instructional practices that can be difficult to compare, and conflicting expectations regarding both the outcomes of literacy instruction programs, and the indicators that are most likely to reflect effective instruction and growth in overall literate competency. This fact is critically important when reviewing findings on best practices for adult literacy instruction and in the development of policies and programs to support adult literacy.

The importance of literacy

Putting aside divergent views about the meanings of literacy, the research and policy literature do point to areas of significant consensus regarding the importance of literacy development, particularly in industrialized countries.

One area of significant consensus pertains to literacy's contribution to economic development. According to a report by Human Resources Development Canada published in 2002, it was expected that by 2004 more than 70 percent of all new jobs created in Canada would require some form of post-secondary education, and that 25 percent of new jobs would, in turn require a university degree. This same report suggested that only six percent of jobs would be held by those who had not finished high school, and that those most likely to have the lowest levels of literacy, early school

leavers, would also likely face the greatest difficulty in finding work, and particularly stable, reasonably paid and fulfilling work.

Further research has also shown that younger adults (who tend to have higher levels of literacy than adults past retirement age) as well as adults with higher educational attainment (those with jobs or those employed in high-skilled occupations) take greater advantage of or have greater access to learning opportunities than others. As Western nations, in particular, become increasingly knowledge-based, and as these same nations face mounting pressures from emerging economic powers such as India and China, economic development opportunities are likely to be even more closely associated with citizens of these nations having the ability to take advantage of a range of lifelong learning opportunities. Research has convincingly demonstrated that more highly educated adults continue learning throughout life, recognizing the importance of lifelong learning and "upskilling" (OECD, 2003). Conversely, adults with low rates of literacy or minimal education or training often report seeing little value or need for additional training or upgrading. If fact, many "believe their skills are good or excellent and thus do not see any need to improve" (OECD, 2003 p.5). Since lower levels of literacy and overall education are associated with both diminished access to ongoing training and upgrading opportunities and with beliefs that such lifelong learning is of limited value, failure to address the problem of limited literacy further exacerbates the precarious economic and social position of low-literacy adults, and diminishes Canada's competitive advantage on the world stage.

Research reveals that employers can play a major role in the promotion of adult learning. Many of the studies included in this review discuss and evaluate workplace literacy programs supported and funded by employers, and suggest that, for a variety of reasons, workplace-based programs could play a significant role in improving literate competency for a variety of workers. However, the evidence also shows that companies tend to invest in training mostly for those workers from whom they expect to gain the highest returns on their investments, which often means investing in training for workers who already have high levels of education (and thereby, literacy), or whose professional

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responsibilities or career trajectories are likely to benefit the most from additional training. This tendency further reinforces the dynamic of providing access to training for more highly educated workers and further limits access by workers who are low-skilled, older, hired as temporary, or working for smaller companies (OECD, 2003), many of whom tend to have lower levels of literacy and education to begin with.

Further connecting literacy and the workplace is the effect of functional literacy on one's employment status. Functional literacy defined by Finnie and Meng (2006) as "the average of one's literacy and numeracy scores" is a stronger predictor of one's employment status, whether determined in terms of numbers of weeks worked, full-time status, having been employed in the last 12 months or being currently employed, than is formal education (Finnie & Meng, 2006). Moreover, the relationship between one's functional literacy score and labour status variables is far stronger for women than it is for men. Literacy levels are also associated with income earning potential. Here, the relationship is stronger for men than it is for women, and, in fact, functional literacy demonstrated no significant effect on the incomes of female high school drop-outs, yet did show an effect on the incomes of those women with at least a high school diploma.

Literacy, income level and gender also intersect when we pay attention to family literacy. It is generally acknowledged that family poverty and low literacy rates have a negative effect on children's readiness to learn. Since the majority of those families living in poverty are headed by lone-mothers, it is important to emphasize the significant relationship between economics and literacy especially as it relates to interrupting the negative cycle of low literacy. Children of less literate parents are more likely to display behaviours that interrupt their readiness to learn and are twice as likely to drop out of school (HRDC and Statistics Canada, 1996).

Equally significant is the inter-generational impact of literacy levels. One of the most significant and earliest influences on the development of children's attitudes towards literacy is the literacy habits and practices of their parents. Moreover, lower levels of literacy reduce parents' access to information-based resources and can limit their

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decision-making abilities. Consequently, children growing up in families with lower levels of literacy are not only likely to be facing greater economic strain but also to be confronted with the challenges imposed by limited information and/or access to services that could help meet their physical and mental health, legal, and educational needs. Simply stated, research shows a strong connection between low literacy and poverty, and that this in turn negatively affects access to services and information that can have significant short- and long-term consequences for the development of children due to less healthy living environments, poor nutrition, and deleterious living practices in general (Public Health Agency of Canada, 2003; Statistics Canada, 2005).

The importance of a highly literate population is both a matter of individual empowerment and development, and an economic and a social issue of fundamental importance. A literate population is an economically adaptable, self-advocating and self-improving population.

Adult literacy in Canada

According to the latest *International Adult Literacy and Life Skills Survey, 2003 (IALLS),* the literacy skills of Canadians are not improving significantly. According to the first edition of the *International Adult Literacy Survey* (1994), slightly more than one-fifth of Canadians faced serious difficulties when addressing any form of printed material, and another quarter of the population struggled with all but the most basic reading and writing tasks of daily life. The average literacy score of adults has not changed markedly since these results were first obtained and many researchers argue that the ongoing low levels of literacy skills among certain groups is having a significant impact on their ability to meaningfully participate socially and economically in Canadian society. This is particularly apparent when one considers the importance of being able to communicate information within a technology-dependent society and global economy.

The results of IALLS 2003 did reveal a slight decrease in the number of Canadians who scored in the lowest level on the literacy scale. Just over 14% of Canadians of working age, or some three million individuals, have difficulty reading and comprehending day-

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to-day print material. This proportion is actually lower than the 17% of Canadian adults who scored at this level in 1994. While not representing a significant improvement in the overall literacy skills of Canadians, it is an indication that fewer adults are scoring at the lowest level of the literacy scale (though this may in part be attributable to a reduction in the number of older adults[3] with lower literacy skills being active in the workforce).

A more complex picture emerges, however, if the distribution of functional literacy is used as a measure of individual literacy ability. When examined this way, the latest IALLS results in fact show that many Canadians are able to perform well only at easy tasks, and that as many as 43% of respondents aged 25 to 64 scored below level 3 on success in processing everyday documents (documentary literacy), the level deemed desirable for success in a knowledge society (Statistics Canada and OECD, 1995). This was not a concern only for older adults, though this group showed a greater tendency to have lower levels of literacy overall. An estimated 39% of Canadians aged 26 to 35 operate at levels 1 or 2, as do 36% of those aged 36 to 45, and 54% of those aged 46 to 55 (Statistics Canada and Human Resources Development Canada, 2001, p. 12). The table below describes these levels in detail. Interestingly, the Canadian situation is, in this regard, quite comparable to that of other OECD countries.

[3] Based on data from the first edition of the IALS survey, older adults—that is to say those over 56 years of age— accounted for more than half of Canadians with limited to very literacy. (Canadian Centre for Justice, 2001).

Table 1. Five Levels of Difficulty for the *Document* domain[4]

Level 1	**Tasks in this level tend to require the respondent either to locate a piece of information based on a literal match or to enter information from personal knowledge onto a document. Little, if any, distracting information is present.**
Level 2	**Tasks in this level are more varied than those in Level 1. Some require the respondents to match a single piece of information; however, several distractors may be present, or the match may require low-level inferences. Tasks in this level may also ask the respondent to cycle through information in a document or to integrate information from various parts of a document.**
Level 3	**Some tasks in this level require the respondent to integrate multiple pieces of information from one or more documents. Others ask respondents to cycle through rather complex tables or graphs which contain information that is irrelevant or inappropriate to the task.**
Level 4	**Tasks in this level, like those at the previous levels, ask respondents to perform multiple-feature matches, cycle through documents, and integrate information; however, they require a greater degree of inferencing. Many of these tasks require respondents to provide numerous responses but do not designate how many responses are needed. Conditional information is also present in the document tasks at this level and must be taken into account by the respondent.**
Level 5	**Tasks in this level require the respondent to search through complex displays that contain multiple distractors, to make high-level text-based inferences, and to use specialized knowledge.**

[4] This table is taken directly from the *International Adult Literacy and Life Skills Survey – 2003* (2005).

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The state of adult literacy in Canada, as measured by the *2003* IALLS is characterized by the following salient findings:

- Adult Canadians residing in the Yukon, British Columbia, Alberta and Saskatchewan tend to score above the national average in the four domains of competency measured by the survey (prose literacy, document literacy, numeracy, and problem-solving), while residents of Newfoundland and Labrador, New Brunswick, and Nunavut tend to score below the national average.
- Approximately nine million Canadians between the ages of 16 and 65—or roughly 42% of the population surveyed—scored below the Level 3 threshold in prose literacy on the IALLS 5-level rating system. Nearly half of Canadians were assessed at below Level 3 when the results of Canadians older than 65 were included.
- Even in the jurisdictions with the highest levels of performance, some 30% of survey participants scored below Level 3.
- Francophones living in minority situations tend to have lower levels of literacy, a result that was particularly relevant for those who chose to be tested in French rather than in English.
- A very high proportion of Aboriginals and Inuit who report primarily using a language other than French or English in the course of their daily activities tend to score below Level 3. Even for urban Aboriginals living in major cities in the southernmost portion of the country, performance often falls below this desired threshold. Their literate competency tends, in fact, to be generally lower than that of their non-Aboriginal counterparts. It is important to note, however, the IALLS 2003 findings reveal that education is a significant variable in reducing these disparities.
- Despite being generally better educated than in the past, some 60% of the immigrant population assessed by the 2003 IALSS scored below Level 3, compared to 37% of the Canadian-born population, although this finding was interpreted as strongly influenced by immigrant respondents' familiarity and level of fluency with either of Canada's official languages.

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Who are adult literacy learners in Canada?

A crucial challenge currently facing decision-makers involves accurately assessing exactly who adult literacy learners are in Canada. Definitions of literate competency, and lack thereof, are strongly influenced by definitions of what constitutes literacy. As conceptualizations of literacy have evolved in terms of both practice and research, notions of who constitutes an adult literacy learner have also changed, thereby making it difficult to draw unambiguous conclusions about the learners who should be among the first recipients of efforts to raise the level of literate ability in the general population.

In the absence of a commonly accepted definition or set of criteria that would allow us to easily identify who adult literacy learners are, it is hardly surprising that no single "inventory" of adult literacy learners exists in Canada. Our research found no officially recognized estimate of the number of adult Canadians actively involved in literacy programs.[5] Equally significant was the absence of a commonly accepted estimate of the number of adult learners in Canada who may be in need of literacy interventions but who are not, for any number of reasons, currently involved in such programs. One exception was an ABC Canada Literacy Foundation study which, based on a 1999 survey it commissioned, found that only 5 to 10 percent of eligible adults had ever enrolled in literacy and/or overall education upgrading programs. This same study also found that, among those who did enrol, drop-out rates were, conservatively, estimated as high as 30 percent (ABC Canada Literacy Foundation, 2001), a finding mirrored by Solorzano (1993) and Ziegler and Sussman (1996).[6] These findings illustrate significant weaknesses in the ability to effectively tackle the adult literacy challenge: it is difficult to properly assess what works for adult literacy learners, and equally challenging to determine what

[5] This is also problematic because much of the research on the effectiveness of adult literacy practices is based on participants who have successfully completed literacy programs, yet we have little sense of what personal attributes or characteristics are most representative of this group. While successful adult literacy learners can inform our understanding of what works for adult literacy learners, they can ultimately tell us little about what *doesn't* work and/or what causes participants to drop out of programs or abandon their efforts at upgrading their literacy ability.

[6] Another study, by Quigley and Uhland (2000), suggests that attrition rates in the first three weeks of program participation for adult basic education programs could in fact be as high as three quarters of enrolled participants.

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more needs to be done to reach out to those who lack literate competency because they are either not involved in literacy improvement programs or unable to remain involved in such programs (Ziegler and Sussman, 1996).

As mentioned above, the most recent administration of the IALSS provided little evidence of significant change in Canadians' overall literacy levels over the last decade and noted that particular groups, namely seniors, those with lower levels of formal education, immigrants whose first language was neither French nor English, and self-identified Aboriginal or Inuit were most likely to have lower levels of literacy (Statistics Canada, 2005). However, the data yielded by these large-scale research endeavours are not universally accepted by literacy researchers as providing reliable estimates of the number of adults facing literacy challenges.[7] Nonetheless, examined in combination with the extensive body of qualitative adult literacy and learning research, these surveys allow us to sketch out a possible profile of adults in need of literacy interventions and instruction services in Canada. They include:

- Early school leavers, individuals who have completed less than high school. While not all early school leavers have lower levels of literacy, many have reduced literate competency and are, as a result, likely to have either garnered limited benefit from what schooling they did receive, and/or to be less inclined to complete or pursue their education in the future.[8]
- Those who have completed high school but who have not pursued post-secondary education. The precarious nature of employment, and limited employment opportunities, available to those with no more than a high school education mitigate chances for the improvement and/or upgrading of skills. In part, this is likely to be related to those factors which are most often cited by non-participants and/or those who drop out of programs as reasons for not enrolling and/or leaving

[7] As illustrated by Graff's criticism (1997) of the assumptions and definitions of literacy adopted in the first edition of the *International Adult Literacy Survey*, as well as that made by other researchers on the limited ability of large-scale, longitudinal instruments to meaningfully inform policy and program development, given that these fail to yield information about effective practices. (Quigley, Folinsbee and Kraglund-Gauthier, 2005).

[8] Although, as indicated elsewhere in this report, a number of factors other than level of schooling—including age, gender, the amount of time that has passed since leaving formal schooling, financial pressures, etc—affect individuals' willingness to pursue or complete their education later in life.

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literacy and/or upgrading programs (discussed later in this chapter). It is also influenced by the greater availability of educational and training opportunities directly available through their workplace for individuals who are employed vs. those who are not employed.

- Those who are employed (and have been so for some years), and are likely to have some form of formal post-secondary education and/or training, but who are working in declining sectors of the economy. This group is less easily identified and likely to comprise older individuals with a wide variety of literacy skills and abilities. This group is nonetheless significant because it accounts for individuals who, while likely possessing some reliable foundational literacy skills, have had limited opportunity to utilize these skills through their work and/or to expand them to meet the requirements of new economic sectors of activity into which they are being redirected (Illeris, 2006).

Within these categories, and as illustrated by the data garnered from large-scale surveys such as the IALS and ALLS, certain groups of individuals (older workers, immigrants with limited linguistic competency, those employed in low-pay and low-skilled jobs, women with limited education, etc.) are even less likely to possess well-developed literacy skills. What emerges as significant from both qualitative investigations and large-scale studies is a portrait of adult literacy learners as a highly varied and ill-defined group, one whose members have a diverse and complex set of needs and personal experiences that influence their ability to enrol, and remain in literacy training and/or educational upgrading programs. The broad spectrum of characteristics presented by these learners must be considered because they can significantly affect the outcome of participation in literacy and/or educational programs. Thus, evaluation of findings about best practices in adult literacy instruction demands prudence.

<u>What existing research suggests we should keep in mind</u>

The previous discussion of the various conceptualizations of literacy, of the importance of literacy for individuals and societies, of the state of adult literacy in Canada, and of the challenges associated with identifying adult literacy learners illustrates that tackling the

problem of low literacy is no simple matter. It involves considering the complex, varied, and often unpredictable needs of a wide variety of learners, most of whom are likely to present with equally complex, varied and unpredictable sets of abilities and experiences. As discussed shortly in the summary of findings, Kruidener (2002) indicates that the range of literacy skills and needs of each learner has a strong impact on determining both the type of instructional intervention needed and the ultimate effectiveness of each intervention. According to Kruidener, proper assessment of each learner's actual abilities is of fundamental importance in determining which instructional practices are likely to yield the best results in terms of improving literacy.

The ultimate effectiveness of "best" literacy instructional practices will be influenced by the personal, economic, and social circumstances of each learner. Among low-literacy and/or low-skilled adult learners, each individual's educational, employment and life experiences and circumstances, and the reasons supporting his or her motivations for seeking out skill improvement, are powerful determinants of his or her involvement and ultimate success in upgrading programs. While by no means exhaustive, the research findings that follow are meant to underscore the factors that should be considered in assessing the findings from a review of best instructional practices. They also draw attention to the influences and conditions that must be considered when determining which policy initiatives and programmatic priorities should be emphasized in helping Canadians meet both present and future literacy challenges.

Basics of supportive and successful instructional environments for adult learners.
As convincingly demonstrated by Illeris (2006), adult learners who are returning to education to upgrade their skills require different approaches than those adopted in traditional K-12 and post-secondary learning environments that serve students with uninterrupted—and successful—educational trajectories. Among other factors, Illeris suggests that program involvement and persistence by adult learners, particularly those who are low-skilled or present with limited literacy abilities, require:

- sensitivity on the part of program staff to the frequently negative feelings that adult learners have with regard to formal learning;

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- the need for learners to feel in control of their learning and progress through a program—that is, the need to be treated as adults who are given responsibility about their own progress, rather than being taken in charge by those delivering educational programs;
- the availability of counselling and/or other supporting services (job placement, educational and/or economic planning, physical and mental health, assistance with childcare, etc.) that can help address the many barriers faced by low-skilled/low-literacy learners in getting and remaining involved in programs, and using their newly acquired skills once they leave a program;
- ensuring that programs are available at times, locations, and for a duration suited to the needs of adult learners while also allowing them to meet their many other responsibilities and commitments; and
- stable core funding that supports and covers activities associated with program delivery and those associated with planning, assessment, and professional development.

These findings are mirrored in a report by the OECD (2003) that suggests successful program participation by adult learners requires a conducive environment highly responsive to the motivations and goals of learners; instructional approaches that can be easily adapted to the skills, abilities, and needs of individual learners; meaningful assessment of learners and support of professional development; proper recognition of individual learners' prior learning; and delivery models and materials that are suited to the ways that adults learn as evidenced by research.

Research also suggests that effective programs that successfully support learner engagement and participation must rely on proper and varied assessment techniques that help adult learners recognize their most significant needs, while also respecting their prior learning. Studies have shown that respondents with the lowest levels of skills tend to overestimate their literacy and numeracy abilities and may, therefore, be less likely to seek out help to improve their skills even if help is needed (ABC Canada Literacy Foundation, 2002).

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Factors that undermine program engagement, participation and persistence

It is important to examine the factors that undermine program engagement, participation, and persistence. For example, a recent study by the ABC Canada Literacy Foundation (2001) found that:

- 43% of adult learners who failed to enroll in programs after having sought out information identified program implementation problems such as not being called back by a program staff, long waiting lists, unsuitable course times, and content or teaching structure that seemed ill-suited to their needs as reasons for not completing their enrollment.
- Significantly, 30% of those who did not enroll identified socioeconomic and personal circumstantial factors as the main barriers they faced in participating in a program.
- Of those who enrolled but later dropped out, more than a quarter identified program factors as the main reasons for leaving programs. These factors included being assigned to or choosing the wrong program level, inadequate content or teaching structures, and program cancellation.
- Participants reported a variety of motivating factors for seeking information about upgrading programs. These motivations included (but were not limited to) extrinsic benefits such as the search for vocational and economic mobility, and intrinsic benefits such as enhanced participation in community life and greater ability to meet family responsibilities and negotiate life transitions. Participants were less likely to become or remain involved in programs if they felt these were not likely to match their motivations.

More than three-quarters of those who dropped out from upgrading programs indicated they were likely to seek help again in the future. This finding indicates that people disengage from programs due to the particular circumstances they are facing at a given time rather than in relation to a set of personal attributes or characteristics that they may not be able to change (such as their previous educational experience). Furthermore, high program costs—or programs costs perceived to be excessively high by participants– and/or lack of financial resources were reported elsewhere as a major barrier by 40% of

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those who wanted to take a course to upgrade their skills but did not. (Statistics Canada & Human Resources Development Canada, 2001, p. 3)

Impact of family commitments and work responsibilities

Because low-skilled/low-literacy learners tend to already function in precarious social and economic circumstances their pursuit of educational and skill improvement is strongly influenced by their ability to meet family commitments and work responsibilities. The lack of resources available to many such learners that could help them meet their family commitments (such as affordable and reliable childcare) and work responsibilities (such as the requirement to balance the need for income in the face of inflexible work schedules) often has a significant impact on adult learners' ability to pursue their educational objectives. For example, the ABC Canada Literacy Foundation (2001) study found that, of those with children, more than 40 percent of women and close to 20 percent of men identified childcare issues as a factor in their decision not to enroll in upgrading programs.

In a separate study, the ABC Canada Literacy Foundation (2002) found that concerns about participation in educational upgrading interfering with paid employment were cited by, on average, half of those who choose not to enrol in programs (ABC Canada Literacy Foundation, 2002). These findings, and the role of daily responsibilities in mitigating involvement in training programs, are also supported by findings of studies conducted by Statistics Canada and Human Resources Development Canada (2001) showing that:

- Lack of time due to a busy work schedule was seen as the most important barrier to the pursuit of education and training by close to 60% of those who wanted to take a course or training but did not.
- Relatively more women than men reported family responsibilities (26% vs. 15%) and childcare (17% vs. 4%) as a barrier to further education.

Gender pressures

Gender differences add a layer of complexity to the range of intersecting needs and attributes that make it difficult to meet the needs of adult learners. Women are, for

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example, much more likely to identify socioeconomic and circumstantial factors than men as reasons for not pursuing educational skill upgrading, reflecting women's generally lower levels of income and greater responsibility for childcare and family needs. These significant barriers faced by low-skilled/low-literacy women are further compounded by the fact that these learners are often employed in economic sectors where opportunities for upgrading through the work environment are severely limited. Moreover, many women carry the additional burden of seeking educational upgrading after leaving threatening or unpredictable personal or family situations which further undermine their belief in their ability to succeed in upgrading programs.

Interventions need to be multifaceted and integrated to meet the goals of learners

Research suggests that the skills acquired through specialized programs such as workplace literacy and/or upgrading programs do not necessarily transfer to other areas of individuals' lives (Ziegler & Sussman, 1996), possibly because the skills acquired in these programs are either very specific and/or because, following program completion, participants often have few opportunities to practice these skills outside of the workplace.[9] Family literacy programs, in contrast, appear to have a positive impact on the abilities of low-literacy adults because they integrate more opportunities for the practice and use of literacy-related skills outside the context of the program itself (Padak, Sapin & Baycich, 2002). This underscores the need to develop a range of complementary program options to ensure optimal opportunities for literacy skill development and use.

[9] However, research also indicates that workplace-based programs can be highly effective in supporting learner engagement and persistence because they offer participants the opportunity to relate their learning to tangible and concrete situations that have direct meaning for their daily activities and responsibilities.

Methods

Protocols

This section outlines the protocols and procedures we used to identify, include, and evaluate research evidence devoted to best practices in adult literacy.

These methods comply with well-established review protocols, applying thorough and transparent procedures to the collection and analysis of evidence-based research. Such measures include: (1) identification and conceptual framing of the research question; (2) search strategy development; (3) searching; (4) initial inclusion/exclusion; (5) document retrieval; (6) secondary inclusion/exclusion; (7) evaluation; and (8) representation of results.

The Research Question

During our initial consultation with representatives from the British Columbia Ministry of Advanced Education, key concepts and the foci of the research question were discussed. The population of focus was identified as adult learners working to improve literacy skills in their first language. It was agreed that the intervention could include a variety of adult education settings and programs such as: workplace literacy; family literacy; computer assisted programs; and, adult basic education programs. With the concurrence of the BC Ministry of Advanced Education the review was limited to research using experimental and quasi-experimental designs.

Search Strategies

The search strategy development process included assembling a comprehensive list of both *free terms* and *controlled vocabulary*.[10] *Free terms* relevant to best practices in adult literacy were identified with the assistance of experts and practitioners in the field. These terms were then used to identify matching and/or complementary *controlled vocabulary* using database thesauri.

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[10] *Free terms* are generic terms used in everyday language; whereas *controlled terms* are descriptor terms that come from database thesauri.

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The final search approved by the BC Ministry of Advanced Education was: *adult literacy OR adult basic education OR adult literacy programs OR adult reading programs OR functional literacy OR workplace literacy OR community literacy OR family literacy AND benchmarking OR best practice**[11] *OR empirical method* OR empirical research OR empiricism OR evidence-based research OR fieldwork OR meta analysis OR program effectiveness OR quantitative method* OR quantitative research OR research method* OR social science research OR statistical data OR statistical measurement OR systematic review OR theory practice relationship OR valid**

Eleven databases were identified as particularly relevant to the search: Academic Search Premier; Campbell Collaboration; CBCA Education; Education Index Full Text; EPPI (Evidence for Policy and Practice Information Centre); ERIC (Education Resources Information Center); Linguistics and Language Behaviour Abstracts; PsycArticles; PsycINFO; Sociological Abstracts; and, Web of Science.

The final search strategy was applied to each database and results were exported to a citation management program. The final search strategy was modified to meet the limitations of each database. Any adaptations were noted within the search diary.[12]

To meet the time and resource constraints of the project the search was confined to a period from 1985 to the present. Wherever possible, searches were confined to citation, abstract and descriptor fields.

Searching for fugitive literature also involved the collaboration of experts and practitioners in the field. Key websites were gathered and reviewed for relevant publications, references and links to other pertinent sites. These websites were then used to locate similar websites using the advanced search function of Google: "find pages

[11] The * is a truncation tool used in searching. Researchers attach the * to a root word which then allows the capture of all variations of that word. For example, parent* retrieves parenting, parenthood, parental, parents etc.
[12] The lengthy search diary is available upon request.

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similar to the page." All bibliographies of relevant reviews and studies were also hand searched for potentially relevant articles not captured in our initial search. These articles were located whenever possible. In addition, other fugitive literature was retrieved for the sole purpose of informing the text of the report. These articles, although included in the text and bibliography, were not analyzed.

Ultimately, 3166 articles were collected for review. After citations were sorted for duplicates, this number was reduced to 2575.

Criteria for Inclusion

Once duplicates were removed, inclusion and exclusion criteria were developed. Based on titles and abstracts only, studies exhibiting the following inclusion criteria were retained for further assessment and evaluation:

	Inclusion Criteria	*Exclusion Criteria*
Population	Adult learners	High school ABE grad certification programs; ESL learners; learning disabilities; K-12
Intervention	Literacy training; literacy programs; community literacy; family literacy; workplace literacy	Numeracy only studies; computer literacy (*not to be confused with literacy programs that use computers*); technical workplace literacy (*i.e. specific workplace language training*)
Outcomes	Best practices; successful programs	Theory articles; editorial articles; case studies
Methods	Empirical; quasi-experimental; surveys; comparative studies	Policy statements; guidebooks; program descriptions only

This process reduced the number of included studies to 371.

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A secondary inclusion/exclusion process was then conducted based on reading the entire study. In order to be eligible for final evaluation, studies had to meet the following inclusion criteria:

1. The intervention was aimed at improving reading, writing or comprehension literacy.
2. The intervention was delivered in the participants' first language, and participants were from western countries.
3. Articles were written in either English or French.
4. The study reported on at least one literacy outcome measure as an indicator of best practice.
5. The study design was either an experimental design (i.e. random assignment to groups) *or* a quasi-experimental design using statistical controls or a comparison group.

Additionally, if a study did not meet the above criteria but could inform the written report, it was included as a "relevant review".

Of the 371 articles, 191 were excluded and 103 were irretrievable in full-text format within the time and resource restrictions of this review. Thus, based on the above criteria, a total of 79 studies were included for analysis in the final evaluation stage of the review; 25 of these were identified as "relevant reviews".

Screening

The 54 remaining studies were evaluated for methodological rigor and the presence of a stated or computable effect size. This procedure removed another 33 studies. In addition, 7 studies were identified as being reviews of evidence which also resulted in their being removed from the final evaluation phase. However these reviews were summarized and discussed in the *Findings* section of the report.

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Reporting

The final number of included studies for summary and evaluation was 14. These studies are analyzed and discussed within the *Findings* section of this report and effect sizes are calculated for the various interventions discussed. A further decision was made to include, in table format with accompanying brief text, those studies where effect sizes could not be calculated. These studies are not analyzed further than the summary table, and statements of best practices are not drawn from this literature. Still, we included these studies in order to give readers a better sense of the types of interventions being examined empirically in the field of adult literacy research.

Why are effect size measures important?[13]

While statistical tests of significance tell us the likelihood that experimental results differ from chance expectations, effect size measures inform the researcher about the relative magnitude of the experimental effect. Hence, effect sizes quantify the size of the treatment effect. Effect sizes are important because they allow researchers to compare the magnitude of effects across studies.

In essence, an effect size is a mean difference divided by the standard deviation. It is the division by the standard deviation that enables us to compare effect sizes across experiments. Cohen's *d* is a measure of effect size which uses the following specifications in terms of relative magnitude of the effect:

Negligible effect (> = -0.15 and <.15)
Small effect (> = .15 and <.40)
Medium effect (> = .40 and <.75)
Large effect (> = .75 and <1.10)
Very large effect (> = 1.10 and <1.45)
Huge effect >1.45

[13] Thalheimer, W., & Cook, S. (2002, August). *How to calculate effect sizes from published research articles: A simplified methodology.* Retrieved May01, 2006 from http://work-learning.com/effect_sizes.htm

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Cohen's *d* has several advantages over other effect size measures. First, it is widely used by researchers in education, and hence, calculating *d* enables immediate comparison of an increasingly large number of published studies. Second, Cohen's specifications allow researchers to compare effect sizes to known benchmarks.

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Findings

In this section, the 14 studies that met the inclusion criteria are reviewed and effect sizes are calculated from the authors' data. Beyond the fourteen studies, seven reviews of evidence on adult literacy programs are examined. The 14 studies are arranged thematically. Two studies (Mikulecky & Lloyd, 1997; Durgunoglu, Oney & Kuscal, 2003) describe more than one intervention and thus appear in more than one thematic section. Each study is described in detail only once. Each thematic section is contextualized in italicized text briefly outlining the theoretical background of the interventions and/or outcomes described. Following the descriptions of the14 studies, the seven reviews of evidence are examined. Finally, 25 studies which fit the criteria for inclusion, but for which effect sizes could not be calculated are thematically summarized to retain their insights. In the following section implications for decision-making are considered.

Studies with Effect Sizes

Relevant instruction

Very little empirical research documents the outcomes of different types of adult literacy instruction (Wagner & Venezky, 1999; Purcell-Gates et al., 2002; Bell et al, 2004). However, the crucial role of relevant or authentic tasks is a staple of contemporary pedagogical theory. Adult literacy amplifies authenticity's importance. Most adults undertake literacy training as a means to an end (Solorozano, 1993); be it a (better) job; better job performance; better ability to care for children; or increased confidence in daily living. Adults will likely have little patience with curricula that appear not to reflect their needs. Therefore, the goals of adult learners are paramount when planning curriculum (Boraks & Richardson, 1985).

Curricular materials must be appropriate for adults' intellectual levels. Adults naturally do not wish to use resources designed for younger children, though their reading ability may be at a primary school level (Nwakese & Seiler, 1993). Sticht (1988) argues that the use of work related materials creates higher increases than general literacy materials in

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both workplace and general literacy levels. Overall, literacy instruction that directly addresses adults' real world needs, or is 'situated' in meaningful contexts such as workplace tasks like reading documents and completing forms, is expected to be more successful than instruction abstracted from adults' daily realities such as isolated grammar and phonics drills (Ziegler & Sussman, 1996; Solorozano, 1993; Barker, 1991).

Four studies examine the effects of including workplace or other 'authentic' materials in literacy curricula. In Pennsylvania, Lipiec, Campbell, Cortese, Dyer and Giguere (1993) recruited students from the General Education Development (GED) waiting list and divided them into two groups. The control group (n = 35) received traditional GED instruction while the experimental group (n = 34) received GED instruction with functional and workplace literacy contexts emphasized. Both groups received two hours of instruction twice a week for six months. The authors report no difference between the two groups in reading comprehension scores on the ETS Test of Adult Literacy Skills prose and document subtests, the Adult Basic Literacy and Education (ABLE) test, in their retention rates, or their success in meeting program goals. Indeed, only 14 students from each group finished their programs.

For those who completed the program, our re-analysis of the authors' data provides evidence of an effect on ABLE gain scores for those in the treatment versus the control group: *Cohen's d* = 1.27. Nonetheless, the authors describe many problems with the instruction of the experimental group: the group was given too few pre-program study skills sessions; they spent less time than originally planned in career-readiness sessions; lack of time and funds prevented them from getting some of the resources they needed until the end of the program; and when these resources did arrive they were deemed inadequate. Furthermore the experimental group received one less class than the control group due to a snowstorm. It cannot be concluded from this study that authentic learning resources do not affect outcomes.

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Other studies do show a more positive relationship. Purcell-Gates, Degener, Jacobson and Soler (2002) report on 173 adults attending basic education programs across 22 US states. They compared teacher-student collaborative instructional approaches to teacher-directed instructional approaches, and curricula featuring purposes and texts 'authentic' to students' lives, to curricula focused on phonics, grammar, discrete skills and 'non-authentic' tasks. Their dependent variable was the frequency and sophistication of students' home literacy practices as measured on a Home Literacy Practice questionnaire. Although this measure was not one of ability, given the short term nature of most literacy programs, the indication of increase of frequency of literacy practices outside the 'classroom' is an important outcome.

Their results show that students who engaged in highly authentic course work made significant gains over those engaged in non-authentic tasks in both frequency of reading and writing, and the types of texts read and written; the effect size for this relationship was a relatively small *Cohen's d* = .16. The degree of collaboration between teacher and student showed no significant effect. The study is somewhat limited in that participants were a volunteer (not a random) sample, and that the outcomes measure relied on self-reported data which could not be independently verified.

Mikulecky and Lloyd (1997) compared six different worksites. Using two tests they divided the work sites into two groups; sites with a 'high workplace orientation' which devoted at least 20-30% of instructional time to workplace specific tasks (n=92 for first test; 95 for second test) and sites with a 'low workplace orientation' which did not (n=69; 85). Because each group was an aggregate of different workplace programs, actual hours of instructional time cannot be calculated.

In the first test, the dependent variable was "future literacy plans" such as taking another literacy course in the future. They report that instruction with a high workplace orientation produced greater gains than low workplace orientation instruction in developing students' future literacy plans; the effect size of a high versus low workplace orientation was a medium strength *Cohen's d* = .41. In the second test, the dependent

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variable was the ability to perform workplace literacy tasks. High workplace orientation produced superior gains in abilities to perform workplace literacy tasks, though the effect size of high rather than low workplace orientation was a smaller *Cohen's d* = .36.

This latter finding is a function of 'testing what is taught,' but an important function for employers sponsoring literacy programs to remember, if they view literacy programs as a means to creating more effective workers. The former finding indicates the role of relevant curricula in instilling positive attitudes toward future learning in students, a vital disposition if literacy development is to continue to develop at program's end. Both findings were measured on researcher developed instruments.

Durgunoglu, Oney and Kuscul (2003, see full description below) describe two different experiments conducted on a literacy program in Turkey. In one experiment, a treatment group of 612 women received 90 hours of instruction in a program including many functional literacy exercises drawn from daily life experiences. Their outcomes were compared to a control group of 73 women who received traditional literacy classroom instruction not focused on functional literacy activities. Most of the sample were village-born; ninety-one percent had no previous schooling. Outcomes were measured by comparing scores on various researcher developed post-tests, where the functional treatment group made gains in all areas.

Effect sizes of post-test differences of belonging to the functional treatment group versus the control group were as follows: letter recognition (*Cohen's d* = .48); spelling (*Cohen's d*= .57); writing name (*Cohen's d* = .15); decoding (*Cohen's d* = .37); capitalization (*Cohen's d* = .81); syllabification (*Cohen's d* = .74); reading comprehension (*Cohen's d*= 1.12). The treatment group showed significantly better performance on the final tests even though they had started at literacy levels below the control group. The researchers also claim that those with a better foundation in literacy at the program's commencement made better gains. These findings, while relatively robust, may be only minimally generalisable to English speaking Canadian populations, as relatively few Canadians share the sample's lack of formal education.

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Computer assisted instruction

Much interest surrounds the use of computers and other technology in adult literacy instruction. Not only have computers become ubiquitous features of daily life, they may provide for privacy, feedback and faster learning
(Racha , 1995). The potential for private and immediate feedback for adult learners may be especially important given the low self confidence that sometimes characterizes this population (e.g. Hayes & Darkenwald, 1988). Nonetheless, CAI can only be as effective as the software used; it may be that more recent software innovations will lead to more effective CAI results than those shown below.

Lavery, Townsend and Wilton (1998) examine CAI's effects on micro-level skills: word recognition; word accuracy; and, comprehension. The authors examine participants in an employment training program in New Zealand. A CAI treatment group (n = 6) and control group (n = 6) using traditional textbook and lecture methods were established through non-random selection. The treatment group received 18 one hour sessions of CAI over seven weeks using 'Successmaker' software that focused on the above three skills. The control group studied the same skills over the same time period using traditional instructional methods. The CAI group made statistically significant greater pretest/posttest gain scores than the control group in all three skills measured by Neale Reading Tests and the Burt Reading Test. Because standard deviations for differences in gains were not reported, the effect size of each instructional method (CAI and control) on gain scores for each test has been calculated:

- Burt Reading Test – CAI *Cohen's d* =1.52, control *Cohen's d* = .32;
- Neale Accuracy Test – CAI *Cohen's d* = .57, control *Cohen's d* =*.04* in favour of pre test;
- Neale Comprehension Test – CAI *Cohen's d* = .65, control *Cohen's d* = .03.

Although the study appears to have been well conducted, the very small sample size should be remembered when interpreting these data.

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An American study ten years earlier in a different context produced similar results. Maclay and Askov (1988) divided participants in the Pennsylvania State Adult Literacy Coursework project into a CAI treatment group (n = 32) that used courseware developed by the Pennsylvania State Department of Education, and a traditional instruction control group (n = 24). All participants were parents (19 fathers and 37 mothers) reading below the fourth grade level; their mean age was 36.5. Both groups received 20 hours of instructional time on six curricular modules focused on computer familiarity, vocabulary development, word recognition and word usage.

The treatment CAI group posted greater gains than the traditional instruction control group on all four standardized pretest/posttest measures. The effect sizes of receiving the treatment rather than the control instruction were as follows: a medium effect on the Slosson Oral Reading Test, *Cohen's d* =.64; very large effects on two sections of the Baltimore County Design Test, *Cohen's d* = 1.33 & 1.57; and, a large effect on the Bader Reading and Language Inventory, *Cohen's d* = 1.03. The authors assert the treatment group gained an average of one grade level in reading ability, and that traditional instruction methods take between 50-100 hours to achieve similar gains. This study is limited by attrition in both groups.

A more recent study examines the effects of computers on developing macro-level literacy strategies. Specifically, Hemming, Symons and Langille (2002) used computers to teach three writing strategies commonly needed in computer communication (i.e. email and chat groups). These were: expressing and explaining a viewpoint; asking pertinent questions when requiring information; and responding effectively to others' messages. Participants were 22 unemployed adults in Nova Scotia, age 18-48, enrolled in various programs at a community work centre. Treatment consisted of three 40 minute sessions using computers to work with each strategy, and two cumulative 40 minute sessions for a total of eleven sessions. There was no control group. Gains were measured by comparing, via Test of Written Language-Third Edition (TOWL-3) criteria, pre and post program writing samples responding to case studies.

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The authors found participants provided more explanation of their viewpoints after instruction, and the overall quality of their writing as measured on the TOWL-3 criteria showed a medium-sized improvement effect of *Cohen's* $d = .55$. While the quantity of words produced did not significantly change, quantity of sentences did, with a large effect size of *Cohen's* $d = 1.00$, possibly indicating more grammatically correct sentence structure. Qualitative data indicates participants also felt more confident about their writing ability after the course. Although the study appears to have been reasonably well-conducted, there was no control group – making it difficult to render a strong judgment about the value added by CAI.

Whole language and word level (phonics) approaches

The debate about effective reading instruction is well known to most educators and many parents. Proponents of a 'whole language' pedagogical approach emphasize 'reading for meaning' and global strategies for comprehending whole texts as opposed to individual words and sound symbols (e.g. Goodman, 1986, 1989; Weaver, 1988; Edelsky, 1990). The whole language approach broadly speaking is 'top down;' learners engage with complete texts that are meaningful to them and they use macro-level strategies for comprehension; predicting information, relating information to one's own experiences, and looking at headings, summarizing statements, topic sentences and transition words as clues to meaning might be taught. By contrast, proponents of a 'bottom up' approach favour instruction in phonics and phonemic awareness, as the building blocks of literacy, building blocks which may be especially important for at- risk learners (Henry, 1993); many adult literacy students would fall into this camp (e.g. Comings, Garner & Smith, 2002). Decoding words, and memorizing spelling rules are typical instructional activities. Learning takes place at the word level rather than the whole text level.

Some commentators argue that adults, by virtue of being adults with a wealth of prior experiences and desire for relevant instruction, must be taught with whole language approaches. Venezky et al. (1996) find skill based programs unmotivating for their adult learners and ineffective at addressing their real problems: developing organizational and independent learning strategies. Others agree adults must move beyond understanding

reading as a sound-symbol relationship and understand it as a process of making meaning (Boraks & Richardson, 1985; Solorozano, 1993) if they are to progress. Nonetheless, some insist that phonological awareness is one of the roots of literacy and cannot be ignored (e.g. Bell et al. 2004). Such micro-level skills may be especially important at the lowest literacy levels (Solorozano, 1993).

Meyer and Poon (2001) examine a top down aid to reading comprehension, a 'structure strategy' whereby adults received direct instruction in using the verbal signals in texts that help promote recall. These signals include: headings; preview statements; summary statements; pointer words and the like. The authors compared results between young adults, average age 20, and older adults, average age 69.5, divided into three groups: a structure strategy group (old n = 31; young n = 26); an 'interest list strategy'[14] group (old n = 16; young n = 14); and a control group (old n = 18; young n =16). Reading ability, working memory and cognitive status were controlled through stratification before the experiment began. After six 90 minute sessions with direct instruction in either one of the two reading strategies, or no intervention, five passages were read to test for recall, and results were compared to scores from pre-tests conducted with similar reading passages.

The structure strategy groups, both young and old, made significantly higher gains in reading recall than either of the other groups. The effect size for the older structure strategy group vs. the control group was *Cohen's d* = .45, and for the younger structure strategy group a larger *Cohen's d* = .72. The effect of the interest list strategy training vs. the control group was *Cohen's d* =.21 and *Cohen's d* = .10 for older and younger learners respectively. Although the study is very strong, these results must be interpreted carefully; the sample is drawn from university courses and community groups, populations with higher literacy skills than the average adult literacy learner.

In a separate component of Mikulecky and Lloyd (1997, described above) the authors test the effects of workplace literacy programs that devoted high versus low amounts of class time to the activities of reading and writing, as opposed to discrete skill work. In classes

[14] An alternate reading strategy, not the focus of the article.

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where more than 70% of instructional time was devoted to reading and writing (n= 53), 3.5 times the gains in reading process scores were achieved over classes that devoted less than 70% of their time to reading and writing (n=127); the effect size was a medium strength *Cohen's d* = .61. In classes where 50-70% of the time was devoted to reading and writing (n = 96) three times the gains in future literacy plans, i.e. plans to enroll in another course, were made over classes that devoted less than 50% of instructional time to these activities (n = 65). The effect size of belonging to the more intensive reading and writing class here was a smaller *Cohen's d* = .34. Both these outcomes were measured on instruments created by the authors. As mentioned above, raw hours of instructional time cannot be calculated because all groups are aggregates of participants from different workplace programs.

In another experiment from their aforementioned paper, Durgonuglu *et al.* (2003) describe a Turkish literacy program that combined both top down and bottom up approaches. The Functional Adult Literacy Program (FALP) used literacy practices proven effective over the last two decades. These practices included developing bottom-up skills like phonological analysis and decoding, and top-down skills like critical thinking, reasoning and global reading. Cooperative learning structures were also used, and the course was taught by volunteer instructors for 2.5 hours, twice a week to a total of 90 instructional hours. Participants were 100 randomly selected rural-raised women living in urban areas with little school experience. Sixty were in the FALP treatment group and 40 were in the traditional instruction control group. The FALP group had significantly lower literacy skills to begin with.

After the program, the FALP group had improved in all areas tested using researcher made instruments. Micro-level skills showed large effect sizes of receiving FALP instruction: letter recognition, *Cohen's d* = .89; decoding, *Cohen's d* = .86; spelling, *Cohen's d* = .87. Vocabulary use showed smaller effect sizes: synonym use, *Cohen's d* = .31; antonyms, *Cohen's d* = .29. These effect sizes were calculated on within-group gain scores, not in comparison with the control group. The effect sizes of letter recognition, decoding and spelling were all far higher than those of the control group where

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Cohen's d = 0, .27 and .21 respectively. Vocabulary effect sizes were similar where the control group *Cohen's d* = .44 for synonym use and .25 for antonyms.

The authors conclude the FALP program was significantly more effective in developing word and letter recognition skills, as well as reading comprehension and writing proficiencies, than the traditional literacy program. Although this study is fairly rigorous, the population of rural born Turkish women with no formal schooling may only be minimally generalizable to English speaking Canadian adult literacy populations.

Dietrich (1994) believes phonological instruction is important for adult beginning readers, and the common assumption that adults cannot learn phonological skills is false. She examined the reading profiles of adult poor readers and investigated the effectiveness of auditory perception training in improving their reading ability. The sample comprised community college students (n = 30) registered for a reading and study skills course; all were poor readers according to the Comparative Guidance and Placement Test. Half the sample formed the control group which received reading instruction in metacognitive reading strategies. The other half formed the treatment group which received the Auditory Discrimination in Depth Program (ADD), a structured program of phonological tasks appropriate for adults. Outcomes were measured on: the Lindamood Auditory Conceptualization Test (LAC), a test which perceives compatibility between identity, number and order of sounds in spoken patterns and visual units; and two subtests, word identification and word attack, of the Woodcock Johnson Achievement Test, which require the pronunciation of real words and pseudo-words, respectively, in isolation.

Dietrich reports students in the ADD treatment group made statistically significant gains on all three of the outcome measures, particularly the LAC. The control group made gains only in the LAC, and these were modest. The effect of receiving the ADD treatment versus the control meta-cognitive treatment were *Cohen's d = 1.28* for the LAC, and *Cohen's d = 1.0* for the word attack sub-test.

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Dietrich’s study indicates it is possible to teach phonological skills to adults. It does not indicate however, that doing so leads to improvement in comprehending texts, or is superior to other instructional techniques in leading to text comprehension. All her outcomes measures were tests of phonological ability, so it is unsurprising that the phonological instructional treatment yielded greater test score gains than the control reading comprehension strategy treatment.

Fitzgerald &Young (1997) seek to clarify whether the amount of instructional time is positively related to the academic achievement of adult basic education learners. The expectation is that adults’ basic reading skills improve with persistence in any given adult literacy program. The authors test this hypothesis with 18 independent variables examined for direct and indirect effects on literacy outcomes. Included among these variables are race-ethnicity; gender; initial reading ability; a variety of program specific variables such as; individualized versus pre-structured and fixed instruction; full-time staffing; the experience of the instructors; cost per student ratio and class size.

Three samples were used in the analysis: ESL (n = 349), ABE (n = 111) and ASE (n = 154)[15] students. The study uses a selection bias weighting adjustment and ordinary least squares (OLS) regression in a path analysis framework to identify variables that directly and indirectly influence reading achievement in adult literacy programs. Separate multiple regression models were developed for samples of ESL, ABE and ASK students using OLS regression, in which three blocks of variables were used to predict post-test achievement scores. Path models were then developed using OLS regression to explain the influence of direct effects on literacy outcome on each of the three adult education samples.

Adult education students in each of the three samples improved their reading achievements as indicated by pre/post tests. Effect sizes for pre/post-test gain according

[15] In the abstract, the authors identify three groups: English as a Second Language (ESL), Adult Basic Education (ABE) and Adult Secondary Education (ASE). However, throughout the text, the acronym ASK is used and not ASE. We believe this may be a typological error and that (ASK) is representative of the Adult Secondary Education group.

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to are as follows: ABE, *Cohen's d* = .43; ASE, C*ohen's d* = .39. The authors assert, however, that upon further analysis the effect sizes obtained were moderated by the influences of student background factors such as prior reading ability, and program features such as individualized curricula, full-time instructors and instructor experience.

In terms of best practice, results indicate the importance on hours of instruction in adult basic education may be misguided. Rather, student background variables and other programmatic variables appear to mediate effects more than the length of time one spends in a given program. The influence and positive effect of experienced full-time ABE instructors – instructors with knowledge and confidence – who implement individualized curricula should not be underestimated.

<u>Planning for learning</u>

As discussed, instruction in reading strategies appears to be an effective practice for adult learners. However, on a more general level, learning the habits of effective learning may be especially important for adults. One of Boraks and Richardson's (1985) eight principles for teaching adult learners is to help them manage their time. They recommend reading time management books aloud in class. Solorozano (1993) agrees that adult education teachers must also be counsellors if they expect to retain students, and may have to overcome attitudinal barriers to participation as well as situational barriers such the time demands of childcare. Given the high attrition rates in adult education programs (e.g. Quigley & Uhland, 2000; Ziegler & Sussman, 1996) helping adults manage the competing demands in their lives may be especially important in ensuring continuing participation. Three of the articles included in this review consider the effects of instruction in managing learning on outcomes.

Hudson and Gretes (1994) examine 454 employees (383 male) of Georgetown Steel with a mean age of 40.6 years. These employees participated in the New Horizons Workplace literacy program where they received training in decision making and time management as well reading and writing, and mathematics. Another feature of this program was its high degree of individualization. One-on-one tutoring was available for those with low

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reading skills, and individual education plans were developed for all students in reading and writing, as well as math. Pre and post-tests were developed by the researchers and validated for the study, though no account of this process is offered.

After approximately 31 hours[16] of instruction in math, reading, writing, problem solving and time management, participants experienced statistically significant gains in reading and writing skills. The effect size of gains in reading was quite large (*Cohen's d* = 1.04), but when removing those who scored over 85% on the pre-test, i.e. the most proficient readers, the effect size grew to a mammoth *Cohen's d* = 2.03. The effect size for writing was also a very large *Cohen's d* = 1.46. Because this study examined the program holistically it is impossible to parcel out the effects of time management strategies vs. individualized instruction, and any other instructional variables.

Another study examines the specific effects of planning for learning. In the USA, Meehan *et al* (1999) observed adults from 16 families participating in the Even Start Family Literacy Program. One of the components of the program was 'home visits' wherein the teacher discussed with the families realistic short and long-term literacy goals, and how to plan effective learning experiences for their families. Data were collected over two years of the program. Eight families enrolled in the autumn of year 1, eight in the autumn of year 2. Assessments were made after each year. Unfortunately, neither the amount nor frequency of contact hours is provided. The literacy instrument was the Comprehensive Adult Student Assessment System (CASAS) Reading Literacy Test.

Each year resulted in statistically significant gains in mean scores. The effect size for year one was a small *Cohen's d* =.111, for year two a more substantial *Cohen's d* = .315, for both years together a large *Cohen's d* = .818. As with Hudson and Gretes (1994) results were the effects of an entire program of instruction. Discussions of plans were only one component of the program.

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[16] This number is computed by dividing participants into total number of contact hours reported. No other figure is provided.

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Fortunately Mikulecky and Lloyd (1997) do separate the effects of discussing learning plans on various literacy outcomes. This multidimensional study is described in more detail above (see pages 31 and 36). All outcomes were measured on researcher constructed instruments. The authors found workplace literacy classrooms that featured deliberate discussions of future literacy plans - for example whether the student was planning to take another literacy class - showed three distinct advantages over classrooms where discussion of future plans was incidental or non-existent. First, gains on workplace literacy task performance were three times higher, and had a medium effect size of *Cohen's d* = .61 (deliberate discussion class n = 85; incidental discussion class n = 85). Second, feelings of self-efficacy were much higher, and produced a large effect size of *Cohen's d* = .74 (deliberate discussion n = 85; incidental discussion n = 92). Third, classes that featured discussions of future literacy plans significantly predicted students' actual making of literacy plans, producing a medium strength effect size of *Cohen's d* = .66 (deliberate n = 84; incidental n = 77).

Reder and Wikelund (1994) investigated long-term literacy development among clients from a welfare-to-work program. This follow-up study was conducted with a sample (n=163) of former *Steps to Success* participants – an adult literacy program which begins with a course on career and life planning. Basic skills tests indicated that clients in this welfare-to-work program raised their literacy skills (reading and math) substantially. Skills gains were measured using the difference between pre-test and post-test scores one to three years later. These gains were larger than those typically reported and also represent sustained learning gains, that is, measures of long-term literacy growth that persist years after program exit. Nearly all clients, regardless of entry skill level, experienced literacy growth.

The authors used t-tests to determine pre-test to post-test gains, as measured by the Basic Adult Skills Inventory System (BASIS) and the comparable Comprehensive Adult Student Assessment System. Significant gains in basic skills occurred for both reading and mathematics. Gains for reading, however, were more ambiguous because so many of the clients scored outside the accurate scale range of the testing instruments on reading.

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Also, the self selection of the sample may have biased the results; those who felt that their basic skills had improved may have been more likely to participate. Thus, the *Cohen's d* = .89 should be accepted with caution.

Nonetheless, the *Steps to Success Program* not only indicates that literacy learning is achievable in adults, but also that such gains persist over time. Further, there is strong evidence that the *Steps to Success Program* activities are successful in assisting clients to obtain relevant labour market credentials.

<u>Cooperative learning</u>

The last original study reviewed here concerns affective factors' effects on literacy. Many commentators believe cooperative approaches to learning are important to adult learners (Purcell-Gates, 2002), perhaps because collaborative activities tend to be authentic, or perhaps because collective learning can have an emancipatory purpose (Hayes and Walter, 1995) that disempowered adult learners might value.

Roberts, Cheek and Mumm (1994) compared the effects of the SRA reading program, a program with a cooperative learning focus, between one group of medium security prison inmates (n = 31) who participated in a two and a half day "Community Building Group Process" (CGBP) workshop prior to the reading program, and another group of inmates (n = 34) who did not participate in the CGBP prior to the program. A final control group (n = 26) participated in neither the CGBP nor the SRA reading program. The purpose of the CGBP workshop was to build trust and high levels of communication between participants. The SRA program was seven weeks long. All groups were pre and post tested on the Gates-MacGinitie Reading Test.

Performance gain scores were significantly greater for the CGBP treatment group. The effect size of the mean gain score of those belonging to the CGBP rather than the reading only group was a large *Cohen's d* = 1.12. The effect of belonging to the CGBP group rather than receiving no reading or CGBP instruction was a large *Cohen's d* = .98. The authors conclude community building produces significantly higher gains in

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achievement. While this finding accords with much adult literacy theory (see Purcell-Gates *et al.* 2002) it may have had a particularly large effect on an incarcerated population more in need of such an intervention than the general population.

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Table 2 **Studies with Calculable Effect Sizes.**

Study	Participants	Intervention	Result	Effect Size *Cohen's d*
Dietrich, 1994	**Enrollees in Reading and Study Skills course at community college in Rhode Island**	**Structured program in phonological awareness**	**Gains for treatment group on:** **1) Lindamood Auditory Conceptualization Test (LAC),** **2) Woodcock Johnson Achievement – word attack sub test** **3) Woodcock Johnson Achievement –word identification subtest**	**1) 1.28 (LAC)** **2) 1.0 (Word Attack)** **3) No significant effect**
Durgunoglu, Oney & Kuscul, 2003 part 1	**Rural born Turkish women- no formal schooling**	**1) Focus on functional curriculum**	**Improvements in:** **1) letter recognition;** **2) spelling;** **3) writing name;** **4) decoding;** **5) capitalization;** **6) syllabification** **7) reading comprehension**	**1) .48** **2) .57** **3) .15** **4) .37** **5) .81** **6) .74** **7) 1.12**
Durgunoglu, Oney & Kuscul, 2003 part 2	**Rural born Turkish women- no formal schooling**	**2) bottom-up and top down skills**	**Improvements in:** **1) letter recognition** **2) decoding** **3) spelling** **4) antonyms**	**1) .89** **2) .86** **3) .87** **4) .29**

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Study	Participants	Intervention	Result	Effect Size *Cohen's d*
			5) synonyms	5) .31
Fitzgerald &Young (1997)	**Adults in basic education program**	**hours of instruction**	**pre/post-test gains**	**ABE-TABE: .43** **ASE-TABE: .39**
Hemming, Symons & Langille, 2002	**Unemployed adults in community work centre**	**Computer Assisted Instruction**	**Gains on** **1) writing quality (TOWL criteria)** **2) sentence use**	**1) .55** **2) 1.00**
Hudson & Gretes, 1994	**Employees of Georgetown Steel**	**New Horizons Workplace literacy program with time management component**	**Gains in reading and writing on researcher developed instrument**	**reading = 1.04** **writing = 1.46**
Lavery, Townsend & Wilton, 1998	**Employment training program**	**Computer Assisted Instruction**	**Treatment gains on:** **1) Burt Reading Test** **2) Neale Accuracy Test** **3) Neale Comprehension Test**	**1) CAI =1.52, ctrl = .32** **2) CAI = .57 ctrl = neg.** **3) CAI =.65 ctrl= neg.**
Lipiec *et al.*, 1993	**GED waiting list**	**Functional workplace curriculum**	**no significant effect on ETS** **re-analysis finds effect on ABLE**	**1.27**
Maclay & Askov, 1988	**Pennsylvania State Adult Literacy Coursework project**	**Computer Assisted Instruction**	**Treatment gains on** **1) Slosson Oral Reading Test,** **2) Baltimore County**	**1) .64;** **2) 1.33 & 1.57;**

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Study	Participants	Intervention	Result	Effect Size *Cohen's d*
			Design Test (2 sections), 3) Bader Reading and Language Inventory	3) 1.03.
Meehan, *et al*., 1999	**Families in Even Start Family Literacy program**	**Literacy program featuring discussion of literacy goals and planning for learning**	**Gains in CASAS reading**	**Year 1 group .111 Year 2 group .315**
Meyer & Poon, 2001	**University courses and community groups: two groups, young and old**	**Structure strategy (Reading comprehension strategy)**	**Gains for treatment groups in reading recall from researcher selected passages**	**.45 (older group) .72 (younger group)**
Mikulecky & Lloyd, 1997	**Employees at six work sites**	**1) Workplace curriculum 2) Intensive reading and writing 3) Discussion of future literacy plans**	**1) Better workplace literacy task performance & more future literacy plans 2) Better reading & more future literacy plans 3) Better workplace literacy task performance, improved self efficacy & more future literacy plans**	**1) .36 & .41 2) .61 & .34 3) .61; .74 & .66**

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Study	Participants	Intervention	Result	Effect Size *Cohen's d*
Purcell-Gates *et al.*, 2002	**ABE enrollees**	**Authentic and collaborative curriculum**	**Increased literacy practices measured by Home Literacy Questionnaire**	**0.16**
Reder & Wikelund (1994)	**Clients of a welfare-to-work program**	**Addition of carrier and life planning course**	**Reading gains: 4.0 CASAS scale points**	**.89**
Roberts, Cheek & Mumm, 1994	**Inmates at medium security prison**	**Community Building Group Process workshop prior to reading instruction**	**Gains for treatment group**	**1.18**

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Other Reviews of Evidence

In this section, seven reviews of empirical research, including three meta-analyses, are examined. Four reviews examine the effects of computer assisted instruction. Five reviews examine the overall effectiveness of adult literacy programs. Two of these reviews (Torgerson et al, 2003 & 2005) examine both.

Torgerson, Porthouse and Brooks (2003) conducted a systematic review and meta-analysis of randomized controlled trials in adult literacy and numeracy. Their review includes nine studies; four examining the use of CAI. In their final analysis, the authors note that the overall heterogeneity of evidence-based research in adult literacy makes it difficult to draw generalizable conclusions about the effectiveness of a given intervention and, they caution readers about the low quality of the studies included in their review. Even when they considered the most homogeneous area (the use of CAI among adult prisoners) the effect was approximately a fifth of a standard deviation and not statistically significant.

Rachal (1995) does not conduct meta-analysis; however, he does review 21 quasi-experimental studies examining the effects of CAI conducted between 1979 and 1995. He discovers that researchers have found CAI increases the confidence of adult learners and appears to mitigate attrition. When it comes to actual literacy gains though, the effects appear modest. Ten of the 21 studies reported no statistically significant differences between the CAI and control groups; five studies failed to indicate significance and two showed mixed results depending on the assessment measures used. Only three studies showed clear statistically significant advantage to the CAI group. However, there seemed to be no disadvantage to CAI, and Rachal also argues that privacy, instant feedback and self paced learning are positive features of CAI for adult learners.

Chen (1997) performs meta-analyses of thirteen studies that compare computer based instruction to traditional instruction in adult literacy education. She calculates a significant overall mean effect size of .28 favouring computer instruction. In another test, she finds computer based instruction is most beneficial to adults reading at grade level

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equivalents one to four, producing a huge mean effect size of 2.05, compared to a negative effect for grade equivalent 9-12 readers.

Given the disparate and sometimes questionable findings exhibited by the 14 quasi-experimental studies, it is legitimate to ask about the effectiveness of adult literacy programs overall. Five of the reviews address this question.

As Torgerson *et al.* (2003) observe, many adult learners were previously unsuccessful at school; therefore teaching them more may not have any effect. They conduct a meta-analysis of three studies that compare adult groups receiving instruction to those receiving no instruction. They find receiving instruction is associated with a large and statistically significant effect size (.88) and conclude that teaching adults literacy and numeracy is effective. Nonetheless they temper their results with an awareness of publication bias; elsewhere in their review they observe that articles published in journals tend to produce larger effects than studies that remain unpublished through typical academic channels. Therefore the overall effects of instruction may be lower than they appear.

In a later review of evidence, Torgerson, Porthouse and Brooks (2005) report on quasi-experimental literature in the field of adult literacy and numeracy. They include 27 controlled trials (CTs) that evaluated pedagogies designed to improve adult literacy and numeracy, only 10 of which included calculable effect sizes. Out of these 10 included studies, six examined the use of computer assisted instruction for adult learners. Two reported a positive effect for the intervention compared to the control group, three reported no difference, and one study reported a positive effect for the control group (a negative effect for the intervention).

Sheehan-Holt and Smith (2000) analyze National Adult Literacy Survey data from the USA (n = 2399) and, after controlling for variables that might influence selection bias, are able to find no statistically significant effects between attending versus not attending a basic skills program and subsequent prose literacy. Because many participants

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presumably completed their courses successfully, the authors worry that perhaps basic skills courses are too context-specific to generalize the literacy skills to other tasks. Attending a basic skills class did, however, lead to gains in frequencies of reading practices. Those who had participated in basic skills programs reported reading more magazines, books and personal and work related documents than non-participants.

Beder (1999) analyses the outcomes and impacts of 23 studies documenting the effects of adult literacy programs in the USA and avers, that although participants usually perceive that programs have improved their basic literacy skills, the evidence from testing is insufficient to confirm objectively gains in basic skills. Of the eight studies that documented basic skills outcomes, five suggested gains were made, two suggested gains were not made, and the final study was ambiguous. These studies were limited by specific sample populations, for example welfare recipients, and methodological shortcomings such as subject attrition.

Of particular interest and importance is a report by Kruidenier (2002) for the National Institute for Literacy entitled *Research Based Principles for Adult Basic Education Reading Instruction*. As a part of the Institute's mandate to provide scientifically based reading research, a panel of experts on adult reading research was charged with identifying and evaluating research related to adult literacy reading instruction. Culled from the existing research was a set of 'emerging principles' that may be useful in establishing research and literacy program agendas for the future. A cautionary tone is established from the onset of this report because these principles are based on a relatively small body of experimental research. This is more a reflection on the amount of evidence-based research in the field of adult basic education than the quality of such research.

Seventy qualifying research studies were identified by the panel and 18 emerging research-based principles were established. The principles gathered derive from studies with common themes in which two or more experimental studies with similar results were found. Because the methodology and findings in this report are similar to, and in

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some cases an extension of, results found in our own review, those principles that may inform best practice in adult literacy instruction are listed below. Two of the18 referred to areas outside our criteria (such as, ESL learners and adults with cognitive or learning disabilities). The remaining 16 principles are as follows:

> **Principle:** When measures of achievement are obtained for each crucial aspect of reading instruction (alphabetics, fluency, vocabulary, and comprehension), instructionally relevant patterns of scores, or profiles of adults' strengths and needs in reading, may be observed. These profiles suggest that ABE readers, including those in ESOL programs and those with a reading disability, are very diverse and that any one measure of reading achievement may not be sufficient to identify strengths and needs for instruction.
>
> **Principle:** Adult non-readers have virtually no phonemic awareness ability and are unable to consistently perform, on their own, almost all phonemic awareness tasks.
>
> **Principle:** Adult beginning readers, like all beginning readers including children, perform poorly on phonemic awareness tasks that require phoneme manipulation. The ability to perform more complex operations with phonemes generally increases (in adults without a reading disability) along with reading ability, until word analysis is established.
>
> **Principle:** Adult beginning readers, like other beginning readers, have difficulty applying letter-sound knowledge in order to figure out new or unfamiliar words while reading, although they are generally better at recognizing familiar sight words than children who are learning to read.
>
> **Principle:** Participation in ABE programs may lead to increases in adult beginning readers' word analysis abilities.

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Principle: Phonemic awareness and/or word analysis instruction may lead to increased achievement in other aspects of reading for adult beginning readers.

Principle: Word analysis may be taught using approaches that include direct instruction in word analysis along with instruction in other aspects of reading.

Principle: Fluency is an issue for adult beginning readers, intermediate readers, and perhaps for those reading at more advanced ABE levels. There are very large differences between adults with good and poor reading fluency, and adult beginning readers' fluency is similar to the fluency of children who are beginning readers.

Principle: Fluency may be taught to ABE students and fluency practice may lead to increases in reading achievement.

Principle: Fluency may be taught using approaches that include the repeated reading of passages of text, words from texts, and other text units.

Principle: Adults who qualify for ABE have poor functional literacy comprehension achievement. Although they may be able to perform simple comprehension tasks such as recalling ideas from simple stories and locating a single piece of information in a simple text, they are often unable to combine (integrate and synthesize) information from longer or more complex texts.

Principle: Participation in an adult literacy program may lead to an increase in reading comprehension achievement.

Principle: Providing explicit instruction in reading comprehension strategies may lead to increased reading comprehension achievement.

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Principle: Combining comprehension instruction with instruction in various other components of reading may lead to increased reading comprehension achievement.

Principle: In general, computer-assisted instruction (CAI) is at least as effective as non-CAI in increasing reading comprehension achievement.

Principle: The use of CAI may lead to increased reading comprehension achievement.

Studies without Calculable Effect Sizes

A total of 53 studies met our criteria for further analysis after the second stage of inclusion. During the coding phase we discovered that 25 of the 53 studies did not provide sufficient data to calculate effect sizes, and often discussed challenges in implementation and analysis. However, findings from these studies did reinforce some of the themes discussed in the *Findings* section of our report, and as such, are briefly discussed below. The studies are summarized in Table 3. The majority are evaluations of newly developed literacy programs, usually in the workplace, or studies of specific instructional methods.

Adult versus child learners

The studies reviewed in the Findings section examine top-down and bottom up approaches to literacy instruction. The debate about which is more appropriate is exacerbated in the adult literacy context by the thorny question of whether adults learn in ways different from children. Some commentators suggest that reading develops in an orderly pattern regardless of age. Others believe adults' correctional strategies, and sequences of skill development are not the same as children (see Solorozano, 1993 for an overview). Furthermore, many argue that the life experiences, including negative experiences in prior schooling, and extrinsic motivations of adults to become literate,

create for them different learning experiences than those of children (ibid; Nwakese & Seiler, 1993; Malicky & Norman, 1994).

Two studies (Thomkins and Binder, 2003; Mudd, 1987) examined the differences in learning strategies employed by adult learners as opposed to child learners. These articles do not examine a literacy intervention and an effect size cannot be calculated, but are worth highlighting because they empirically measure the differences between adult and children readers with implications for instruction.

Thompkins and Binder (2003) examined empirically the differences in adults' and children's reading processes to see if each population should be taught differently. They examined the reading performance of 60 functionally illiterate adults enrolled in ABE courses in the USA, and compared results to a sample of 99 children in grades K-2. They observed (a) which factors account for variance in adult reading achievement scores, and (b) what the relative strengths and weaknesses are of adult and children beginning readers. Reading processes were measured on a battery of eight researcher developed instruments and literacy ability was measured on the Test of Adult Basic Education seventh edition (TABE-7).

In answer to the first question, adults' ability to orally spell a list of 10 words and 10 non-words read to them, the ability to spell in writing a list of 10 words and 10 non-words read to them, and the ability to match words to pictures were the three significant predictors of variance on TABE-7 scores, a finding that strongly suggests the relative importance of increasing phonological awareness in adult literacy instruction. In answer to the second question, the strengths that the adults had over children on the eight tasks they were asked to perform seemed to hinge on adults' accumulated general knowledge and experience with language. Although functionally illiterate, adults may be able to remember words which compensates for their lack of ability to decode words. Nonetheless, in contrast to previous research the authors did not note the adults suffering from a lesser ability to decode than the children.

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Mudd (1987) also empirically compared reading strategies of adults and children in the early stages of learning to read. Seventy-two adults attending various centres for adult literacy and 96 children participated, all with a "reading age" of 7-8 years old. All subjects orally read two age-appropriate passages similar in readability, length, and difficulty. They observed the strategies used by children and adults and looked for any differences, including differences arising from the nature of the reading conditions (i.e., with a brief preview of text or without). Subjects' miscues were analyzed, with attention primarily to their sensitivity to graphic and semantic constraints.

Results showed that the general strategies used by the adult readers were similar to those of the less able readers, suggesting that adult literacy teachers should not assume that adults will have a better understanding of the reading process than children. Adult vocabulary and comprehension scores were higher than children, supporting Thompkins and Binder's suggestion that adults have an advantage of accumulated knowledge and experience with language. Mudd also found that each group had more semantically constrained miscues on the passage that was oriented towards their age group, and suggests that understanding can be enhanced if teachers select texts that are familiar or of interest to the readers.

Relevant instruction

Most of these studies looked at family literacy programs, or evaluated literacy programs developed to increase the basic skills of employees in fields such as manufacturing, construction, or nursing homes/hospitals. Most of these programs combined literacy training with workplace relevant materials or information that helps parents become more involved in improving their children's literacy practices. Workplace literacy classes were generally provided on-site during work hours. Family literacy instruction was provided in the home or in a way that provided opportunities for children and parents to learn together, at the same time.

Some workplace studies reported statistically significant gains in literacy levels (Lashof, 1992; Essex Community College, 1994); TALS test scores (Coston and Dagard, 1995),

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reading (Wallace State College, 1993; Schroyer and Payne, 1994), and writing (Schroyer and Payne, 1994). Other studies mention "gains" in reading TABE scores (Associated Builders and Contractors, 1993; Massachusetts Career Development Institute, 1994), CTBS and CRT scores (Merex Corporation, 1991), or reading and language (Snoddy, 1990, Merlin, 1993), but do not mention their statistical significance. Others were unable to report gains due to serious instrumentation (Scheer, 1993; Hacker, 1992) or mortality (Catonsville Community College, 1995) threats to validity. Qualitative measures in these workplace studies suggest that the programs were successful in increasing worker self-esteem, productivity, retention and promotion. It should be noted that none of these studies involved a control group, and they employed a wide range of teaching methods including CAI, tutoring, and classroom instruction. Nonetheless, taken together they do suggest that literacy programs that provide literacy instruction that is relevant to the workplace, and made accessible in the workplace, can improve literacy in adults.

The family literacy studies also all reported improvement in the literacy skills and practices of participants. Philliber et al's (1996) adults gained 4.5 points on the CASAS reading scale, significantly better than the average 2.3 points gain documented in adult focused programs in California. The reported 1.15 grade equivalent gain on the TABE also was significantly better than would be expected by chance. Philliber also reports greater retention rates than those found in adult-focused programs, and suggests that this is in part because it is easier to retain mothers when both mother and child can be engaged together, and/or at the same time, thus eliminating the need to secure childcare in order to attend. Nickse et al (1988) reports gains in reading and vocabulary and retention rates 20-40% higher than those for nationwide ABE programs. Van Horn et al. (1992) also reports gains in reading and a 93% retention rate for parents provided with individualized tutoring in basic skills and family relevant literacy practices. Brooks (1998) finds that parents increased their home literacy practice and ability to help their children with language and literacy. The 361 parents involved in the courses had a 91% completion rate. Again, taken together these studies suggest that relevant instruction such as family literacy creates gains in ability for adult learners. Family literacy programs

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may have the additional advantage of making attendance easier than do traditional classroom instruction programs.

Computer assisted instruction

Three of these studies attempted to measure the effects of computer assisted instruction technologies. Cooper (1993) hoped to discover the potential of home based CAI, and although she reports gains in reading for some learners, her study was challenged by serious technical difficulties with the software and computers. Jeyasingam (1990) combined CAI with guidance from tutors and participants improved an average of one reading grade level. Griffin and Songer's (1988) study involved few participants (5 experimental, 6 control), but the students using the READY course software did show a much higher mean gain than the control group of ABE students. Griffin and Songer deliberately included an auditory learning component after discovering in a previous study that "over 60% of all adults reading below the ninth grade level indicated a strong auditory learning style preference." This finding about learning styles, although not about CAI, may be the most useful information to inform teaching practices in these CAI studies.

Individual approaches

Finally, two studies looked at specific approaches to teaching reading. Darkenwald and Silvestri (1992) assessed Newark Literacy Campaign's Adult Tutorial Reading Program, in which volunteer tutors meet with adult learners for 2 hours per week. Unfortunately, the pre-test assessment in this study was judged inadequate, and as a result gain scores could not be determined. Massengill (2003) provided individualized guided reading instruction to 4 low literate adults who had become frustrated with traditional literacy learning methods. Learners gained between 1-3 reading grade levels, as could be predicted when one-on-one instruction that addresses learners specific challenges can be provided.

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Table 3 **Studies without Calculable Effect Sizes.**

Study	Participants	Intervention	Result
Associated Builders and Contractors, Inc. and others, 1993	**Construction workers from Pelican chapter of Associated Builders and Contractors**	**Open ended/exit, voluntary basic skills instruction program**	**Average pre/post test (TABE) gains 20% Average gain of 2.02 reading grade levels**
Brooks, 1998	**Parents of 3-6 year old in demonstration family literacy program.**	**6 hrs per week basic literacy skills instruction plus 2 hrs per week joint sessions with children.**	**Increased home literacy practice and increased ability to help children with language and literacy.**
Catonsville Community College, 1995	**Employees in the printing industry.**	**Literacy skills instruction designed to meet the needs of workers.**	**Qualitative reports of reading and writing improvement. Staff turnover made implementation difficult.**
Cooper, 1993	**Students specially selected from classes of 8 adult literacy providers. At least gr. 5 level reading ability.**	**Teacher assisted home-based computer assisted instruction.**	**Gains for some learners. Results compromised by technical problems throughout study.**
Coston & Dagard, 1995	**Participants from a national rural workplace literacy program.**	**Basic literacy skills and application of learning to work processes.**	**Aggregate of all classes experienced a statistically significant score increase between pre/post test.**
Darkenwald & Silvestri, 1992	**Learners in an adult tutorial reading program.**	**Adult tutorial reading program.**	**Gain scores could not be determined due to inadequate pre-test assessment.**
Essex Community College; Maryland	**Hospital workers.**	**12-week self-learning packet in basic literacy**	**Gains reported in literacy, self-esteem, job retention of participants.**

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Study	Participants	Intervention	Result
Hospital Association, 1994		**skills.**	
Greenberg *et al.*, 2002	**Adults who had not benefited from previous/current literacy programs.**	**SRA/McGraw Hill Direct Instruction Corrective Reading program**	**60% of students ready for next level of Corrective Reading Program. No improvement in Word Attack and Word Identification subtests of Woodcock Reading Mastery Test**
Griffin & Songer, 1988	**Community college students who were enrolled in some sort of ABE.**	**Ready to Educate and Develop Yourself (READY) video disc. Designed to teach reading comprehension. Deliberate inclusion of auditory learning component.**	**Experimental group showed a much higher mean gain that control group of ABE students.**
Hacker, 1992	**Employees of General Motors.**	**Computer and video assisted job related foundation skills training.**	**Gain scores could not be determined due to inadequate pre-test assessment. Qualitative data suggests gains in workplace and personal skills.**
Jeyasingam, 1989	**Learners in Project READ adult literacy program.**	**Computer and tutor assisted reading instruction.**	**Average gain of one reading grade level.**
Lashof, 1992	**Employees at General Electric**	**Learner-centered, context-based, computer assisted workplace literacy instruction.**	**Significant gains in literacy levels and work performance.**

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Study	Participants	Intervention	Result
Massachusetts Career Development Institute, 1994	**Employees of Geriatric Authority of Holyoke, MA**	**Workplace literacy, ABE, and GED program.**	**Gains in vocabulary, comprehension, self-concept, and employee satisfaction**
Massengill, 2003	**Low literate adult readers.**	**Guided reading instruction individually planned based on readers' needs.**	**Between 1-3 reading grade level improvement. Data is based on individual variability.**
Merex Corporation, 1991	**Employees and at Motorola Microprocessor manufacturing facility and Merex Corporation**	**A mandatory educational program to improve basic literacy skills, and workplace effectiveness skills.**	**Significant gains on Comprehensive Test of Basic Skills. Increased productivity.**
Merlin, 1993	**Employees at five companies in Virginia.**	**Individualized workplace literacy instruction via a mobile learning center or on-site classes.**	**66% gained one level progress in reading, 69% gained one level in language.**
Mudd, 1987	**Adults attending various centres for adult literacy and 7-8 yr old children matched for reading level.**	**Oral reading of passages by both groups to investigate reading strategies used when reading aloud unseen passages**	**Found that adult learners are not necessarily more constrained by semantic cues than children.**
Nickse *et al.*, 1988	**Adults with up to 50 hrs of tutoring and their children who are enrolled in reading programs.**	**Tutor designed lessons using a four-step model (demonstration; guided practice; independent practice; evaluation)**	**Results for adults are mentioned in regard to reading progress in vocabulary and comprehension. Indications are that comprehension increases as a factor of the number of hours of tutoring. Retention rates appear to be one of the biggest problems**

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Study	Participants	Intervention	Result
		Focus on decoding, vocabulary, reading/listening comprehension, study skills, and writing	with program and reported a 73.3 retention rate
Philliber, Spillman, & King, 1996	Families attending the Toyota Families for Learning Program in 50 locations in 15 cities	Some variation between programs but all include early childhood education, parent literacy training, parent support groups, and parent-child interaction	Posttest scores on standardized assessment test showed slightly higher than one grade level improvement in reading ability. Retention rates were a problem with only 59% remaining after 20 weeks. Number of hours in program appears to have greatest effect on test scores
Scheer, 1993	Employees at five manufacturing companies.	Basic skills classes in Reading, Math, and ESL	Gain scores could not be determined due to inadequate pre-test assessment.
Schroyer and Payne, 1994	Employees at an automotive parts plant.	Basic literacy and workplace skills instruction.	Significant gain scores in reading and writing.
Snoddy, 1990	Adult automotive workers participating in a tutoring program as part of a larger adult literacy program.	Individual tutoring sessions using tutorial package selected for each student	Gains of .2 of a reading grade level per month of tutoring. Gains in word comprehension and self-esteem.
Thompkins &	60 Adult Basic	none, predictive tests	phonological awareness predicts reading skills on TABE

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Study	Participants	Intervention	Result
Binder, 2003	**Education students from various programs**	**including: phoneme recognition, phoneme deletion, phonological spelling, digit-span task, orthographic constraints, orthographic spelling, word-picture pairs.**	**for adults**
Van Horn *et al.*, 1992	**14 families recruited for project.**	**Functional, individualized, basic skills family literacy instruction.**	**Only 7 students re-assessed. 6 had gained one reading grade level.**
Wallace State College, 1993	**Employees at Tyson Foods**	**Basic and job specific literacy skills training.**	**All groups had statistically significant gains in math and reading. No data provided.**

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Implications

Most generalizations in educational research should be made with caution. In the field of adult literacy best practices this warning attains heightened salience. As Torgerson *et al.* (2003) observe, existing research is heterogeneous and of relatively low quality; therefore it is hard to suggest specific interventions. Moreover, there are no accepted standards for what constitutes program success, i.e. how much gain should be expected in how long a period of time; therefore it is difficult to suggest a particular intervention leads to success (Beder, 1999).

The studies reviewed here were limited by: subject attrition (e.g. Lipiec *et al.* 1993; Macklay & Askov, 1988); small sample sizes (e.g. Lavery *et al.,* 1998; Meehan *et al.*, 1999); sample populations unrepresentative of most Canadian adult literacy learners (e.g. Durgunoglu *et al.,* 2003; Roberts, Cheek & Mumm, 1994; Meyer & Poon, 2001); suspect data analysis (Lipiec *et al.,* 1993) and inability to isolate the effects of single variables (e.g. Hudson & Gretes, 1994; Meehan *et al.*, 1999). Therefore the implications drawn from these studies are made tentatively and supported by further theoretical and non-experimental work.

Nonetheless, with these caveats in mind, we believe the following implications are warranted:

1. Adult learners should receive direct instruction in meta-learning. This means planning how to make time for learning, planning future learning, and learning meta-cognitive reading and writing strategies (e.g. the structure strategies described in Meyer & Poon, 2001). Attrition in adult literacy programs is a well-documented problem (e.g. Quigley, 2000; Malicky & Norman, 1994). Part of the reason is the competing time demands in adults' lives (Solorozano, 1993). If adult learners are to persist in their studies, they may need assistance in planning how to make time for this. Large gains were shown in the programs that contained a time management component (Hudson & Gretes, 1994) and a life planning component (Reder, Wikelund & Reed, 1994).

   Instruction in planning for future learning unsurprisingly leads to future learning plans (Mikulecky & Lloyd, 1997). Planning for future activities is crucial because most literacy programs do not last long enough for adults to progress as far as they need to. Many hours of instruction are needed (Ziegler & Sussman, 1996). However, planning for future learning also appears to positively affect outcomes in current learning (Mikulecky & Lloyd, 1997; Meehan, 1999). It seems calling attention to students' goals and plans are highly beneficial. This accords with theory stating adults' goals must be integral components of their instruction (e.g. Solorozano, 1993).

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The structure strategy described by Meyer and Poon (2001) exemplifies meta-cognitive learning. Because adults are more cognitively developed than children, they may be more able to reflect on what they are doing to help themselves read effectively. The strong effect size of this strategy in this article indicates its potential value.

2. Adults should be instructed using methods, resources and curricula directly relevant to their lives. This may entail: using workplace related resources; using family related resources, providing instruction in basic survival functions, i.e. reading prescriptions or applying for jobs; or other activities. The theoretical basis for instructing this way appears near unanimous (Solorozano, 1993; Sticht, 1988; Ziegler & Sussman, 1996). The empirical studies here either indicate the value of such an approach (Durgunoglu *et al*., 2003; Purcell-Gates *et al,* 2002; Mikulecky & Lloyd, 1997) in increasing both specific and general literacy task ability and in producing future literacy plans in the students, or fail to discount its value (Lipiec *et al*, 1993).

The degree to which instruction can be individualized may also be helpful, perhaps even more so than actual hours spent studying (Fitzgerald & Young, 1997), a hypothesis which appears modestly supported by the relative success of CAI intervention strategies that favour privacy, individual feedback, and self-paced learning.

3. Adult learners need a balance of both top-down and bottom-up literacy approaches (Kruidenier, 2002). That adult learners need to engage in meaningful tasks, relevant to their personal goals is clear. This principle favours including whole language approaches to literacy instruction. Furthermore Venezky *et al.* (1996) describe learners stifled in basic skills courses when their weaknesses were in organizational skills. Nonetheless, Thompkins and Binder (2003) and Dietrich (1994) show the importance of phonological awareness in predicting reading fairly convincingly and Dietrich (ibid.) shows adults are capable of developing phonological skills. The successful functional literacy program described in Durgunoglu *et al.* (2003) appears to depend heavily on training in word level skills. Consistent with the sample in that study, students at the lowest literacy levels may have the most to gain from such bottom-up approaches (Solorozano, 1993).

4. Computer assisted instruction appears beneficial. Despite methodological limitations, gains were consistent across the four empirical studies reviewed here and in the two meta-analyses examined. One literature review (Rachal, 1995) suggested more modest CAI results than found in the quasi

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experimental studies reviewed here, but, even so, there no negative effects were reported. CAI is likely particularly appropriate for adult learners because it allows: individualization which increases the likelihood of personally relevant learning and immediate feedback; privacy, which favours learners with low self-confidence, a trait typical in adult literacy populations; and familiarity with computers, itself an essential contemporary ‘literacy’ skill. Two studies indicate adults at the lowest reading levels may especially benefit (Chen, 1996).

5. Adult learners have different needs than children. Although the psycho-linguistic reading processes may or may not be different for adults (Thompkins & Binder, 2003; Solorzano, 1993; Boraks & Richardson, 1986), adults arrive at literacy instruction with different strengths and limitations than children. Adults may be advantaged in the knowledge of the world they bring to literacy tasks, but disadvantaged by their lack of success in earlier school experiences. Therefore curricula should recognize adults’ knowledge, and instruction should be sensitive to adults’ vulnerabilities in school settings.

6. Programs should focus on reducing attrition and encouraging participants to continue until they complete the program. Most of the programs and interventions described here were relatively short term affairs. However, literacy gains are often slow and modest (Beder, 1999). Therefore adults need realistic short term literacy goals (e.g. Meehan, 1999) to avoid disappointment, and active encouragement to proceed in further literacy activities (e.g. Mikulecky & Lloyd, 1997). Attrition is a well known feature of adult literacy programs (e.g. Malicky & Norman, 1994) and indeed plagued many of the studies reviewed here.

7. Test score gains may not be the most important measure of literacy program outcomes. Many of the studies reviewed here report reasonable literacy gains on locally developed instruments (e.g. Durgunoglu *et al.* 2003), or on measures other than test scores, such as increased frequency and variety of reading (e.g. Purcell-Gates *et al.* 2002), and affective measures such as increased self efficacy (e.g. Mikulecky & Lloyd, 1997). However, standardized test score gains are often modest, or insignificant (Beder, 1999; Sheehan-Holt & Smith, 2000). It may be that standardized tests are not sensitive enough to capture the literacy gains immediately relevant to adults’ lives, be they improved workplace performance, or a more enriched life. Better and more relevant evaluation tools may have to be developed to assess properly the effects of adult literacy programs (Beder, 1999; Kruidenier, 2002).

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Conclusion

Notwithstanding their attempts, it is difficult for researchers to completely eliminate threats to the validity of their findings and conclusions. We nonetheless believe that there are a number of lessons one can draw from this synthesis of evidence, including, but not limited to, the following:

1. Adults most in need of literacy intervention include: (a) adults who have not completed secondary school and who are not currently in school; (b) adults who have completed secondary school, but who have not pursued further education or training; and (c) adults with further education or training who are employed in the most rapidly declining sectors of the economy.
2. Assessment of each learner's actual abilities is of fundamental importance in determining which instructional practices are likely to yield the best results in terms of improving literacy.
3. Adults should be taught knowledge and skills that they can apply directly to their lives.
4. Adult learners should receive direct instruction about how to make time for learning, planning future learning, and learning meta-cognitive reading and writing strategies such as encouraging them to reflect on what they are doing to help themselves read effectively.
5. Instruction of adults should take into account their prior knowledge and their prior experience in school settings.
6. Phonological awareness (one's sensitivity to the sound structure of language; i.e., the ability to distinguish syllables and speech sounds) and skills development are necessary, but not sufficient, components of many adult literacy programs.
7. Computer assisted instruction appears beneficial for adult learners because it allows for individualization, immediate feedback, and privacy.
8. Programs should focus on reducing attrition and encouraging involvement until the program is completed.
9. Adults need realistic short term literacy goals to avoid disappointment, and active encouragement to continue literacy learning.
10. The assessment of the impact of adult literacy interventions should be carefully matched to the purposes of the program.

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