A Comparative Study of Small Group Classroom Literacy Instruction and Computer-Based Literacy Instruction on the Success of Adult Learners in GED Preparation: A Province Wide Intervention

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1.   Executive Summary

There has been little research into the best means of reducing literacy deficits through educational interventions, despite repeated indicators that a relatively high percentage of the Canadian adult population is functioning below the accepted proficiency level 3 in literacy (Brink, 2006; National Literacy Secretariat, 1995). This literacy deficit can have an effect at both individual and societal levels (Boothby, 2002; Charette & Meng, 1998; Gottesman, & Bennett, 1996; Green & Riddell, 2001; Haring, Lovett, & Smith, 1990; Hoffman et el., 1987; McIntosh, & Vignoles, 2001; Shalla, & Schellenberg, 1998, Canadian Business Task Force on Literacy, 1998; Department of Education, 1998). Much of what is known about literacy skill development has been gleaned from research on school aged students. Research on adults has confirmed that underlying issues related to poor literacy are very similar to the issues within school aged populations (Bone, Cirino, Morris, & Morris, 2002; Brunswick, McCrory, Price, Frith, & Frith, 1999; Thompkins & Binder, 2003). There is also evidence that remediating literacy issues through phonological processing programs is best practice to address literacy deficits (Kruidenier, 2002; Torgerson, Porthouse, & Brooks, 2003). The format and delivery of processing programs tends to vary. Many programs utilize a classroom-based delivery model; however, with dramatic improvements in functionality and flexibility of personal computers, more and more computer delivered phonological processing interventions are emerging. Research on computer delivered intervention models is limited (National Institute of Child Health and Human Development [NICHD], 2000). This present study is designed to directly compare the influence of a classroom-based versus computer-based phonological intervention within development of reading skills and attainment of the General Educational Development (GED) credential for adult learners in the Holland College Adult and Community Education (ACE) programs. The GED is an internationally recognized Grade 12 equivalency diploma with standardized testing protocols. This study is specific to Prince Edward Island (PEI) where over 40% of the working population does not have their Grade 12 diploma and has identified literacy deficits (Brink, 2006); therefore, these adults may require literacy support to obtain a GED credential.

Previous literacy research within ACE programs indicated literacy was an issue for participants in GED programming (McKenna, McMillan & Dempsey, 2004). One hundred and one students ranging in age from 18 to 71 years old with a mean age of 33.5 years (S.D. 11.78) were recruited for this study from the PEI Adult and Community Education GED preparatory programs. Participants were randomly assigned to one of three groups, a classroom-based reading program; a computer-based reading program or a comparison group which received a traditional GED preparation course.

Using the experimental design of pre-test, post-test, and post post-test, the first post-test (time 1) occurred at the end of the reading interventions or 60 hours of the GED preparation program. Post post-test (time 2) occurred when students had completed their GED preparation program. This time frame varied for each participant. Results from time 1 indicated all participants achieved significant results in mastery of academic content, regardless of their exposure to the GED preparatory program. Participants in the literacy interventions were not given any academic content instruction during time 1, yet their academic scores increased significantly. Participants in the GED preparatory program also showed significant gain in academic scores without literacy intervention. The improvement within the comparison group may be attributed to the "use it or lose it" phenomena noted in the latest round of international testing (Desjardin, & Werquin, 2005; McMullen, 2005; Movement for Canadian Literacy, 2005). The mere increase in volume of reading may have been sufficient for the comparison group to improve mastery of content.

Improvement in science, math, and writing were attained either by direct study of the topic areas, as in the GED preparation group, or through the study and development of reading skill using either of two reading interventions. Other meaningful results included a significant correlation between instructors' rated attitude of student ability and performance on reading measures.

Recommendations for programming include the use of phonological processing interventions where students are experiencing the greatest amount of literacy deficit as opposed to providing these interventions for all students. Also, results indicate short intensive

sessions each day over a relatively longer period of time may be preferable to literacy interventions offered as a separate "pull-out" program.

2.   Introduction

Research on efficacy of remediation of reading skills for low literacy adults is limited, yet essential for improving low literacy skills for provincial and national adult populations. This study was designed to explore the influence of two structured reading programs, one classroom-based and one computer-delivered, on the time to complete and success at acquiring a GED (General Educational Development) credential.

On PEI, 42% of the working population aged 16-65 demonstrates low literacy levels according to the International Adult Literacy and Skills Survey (IALSS) (Brink, 2006). In addition, 40% of this working population does not have a high school diploma. Adult and Community Education (ACE) at Holland College, PEI delivers programming designed to address low literacy and to assist adults in acquiring a Grade 12 credential. The GED diploma is recognized internationally as a Grade 12 equivalency credential.

The GED standardized test is produced through Educational Testing Services in the United States and has Canadian content for administration. The test is delivered through the Department of Education on Prince Edward Island, while preparation is provided through ACE GED preparatory programs. ACE is mandated to provide adult education for Prince Edward Island and recognizes the statistics on literacy and academic achievement demonstrate a widespread issue. Therefore, literacy interventions were a logical alternative for application to ACE GED programs. A common misconception about low literacy on PEI is that people identified at Level 2 according to IALSS data cannot read. In fact, many people can read but not with sufficient comprehension for a proficiency of Level 3, the IALSS standard for functionality within the workplace. To support economic development of PEI where the labor force can perform in knowledge- based economical framework requires workforce functionality at a minimal Level 3 (Brink, 2006). Low literacy levels of 1 and 2 identified within IALSS could be a prime factor in a person's inability to obtain a GED. Therefore, trying two different phonological processing interventions, one classroom based and the other computer based would give insight into how to best support our adult learners in attaining their GED.

Given this information, the researchers based this study upon the following research questions:

1) What is the influence of the two structured reading interventions on preparation and attainment of GED?

2) Does participating in the reading interventions influence the length of time to prepare for and attain GED?

3) Does participating in the reading interventions affect scores on the GED examination?

4) Is there a difference between the two programs, classroom -vs. - computer, on participants' reading skills?

3.   **Literature Review**

Canada is a modern industrialized nation with an emerging strong knowledge based economic sector. This emerging knowledge based economy is fostered by both government and industry. However, Brink's (2006) presentation of IALSS 2003, data illustrates 42% of the Canadian population aged 16-65 are functioning at levels 1 and 2 in the area of prose literacy. This is below the accepted level 3 for proficiency and productivity in a knowledge-based economy. Data for Prince Edward Island indicates the same percentage as the Canadian population of adults functioning at levels 1 and 2. This is of significant concern due to the links between low literacy levels and issues such as poor employment and economic disadvantage at both individual and community levels (Boothby, 2002; Charette & Meng, 1998; Gottesman, & Bennett, 1996; Green & Riddell, 2001; Haring, Lovett, & Smith, 1990; Hoffman et el., 1987; McIntosh, & Vignoles, 2001; Shalla, & Schellenberg, 1998, Canadian Business Task Force on Literacy, 1998; Department of Education, 1998). Similar concerns are noted when correlations are observed between low literacy levels and increased dependency upon social support programs and health and social concerns (Desjardins, Werquin, & Dong, 2005; McIntosh, & Vignoles, 2001; Smith, 1997, Rudd, Moeykens, & Colton, 1999). There is a clear positive association between degree of success in the public education system, literacy levels, participation in further educational opportunities and economic independence (Baran, Berube, Roy, & Salmon, 2000; Betcherman, McMullen, & Davidman, 1998; Shalla, & Schellenberg, 1998).

In the Atlantic Provinces and Prince Edward Island in particular, there are concerns regarding the prevalence of low literacy adults and negative influences associated with this condition. The Strategy for Adult Literacy/Education in Prince Edward Island (Department of Education, 1998) reported 40% of adults read only simple material and 17% could not deal adequately with written material encountered in everyday life. Reading the Future (National Literacy Secretariat, 1995) noted that within Atlantic Canada 22% of adults were reading at a level 1 and 26% were reading at a level 2. In addition, data from IALSS indicates that PEI has the highest proportion of adults with low literacy document skills in the country (Longfield, 2003). Though, more recent data reported by Brinks (2006) is more positive, only 14% of the adult

population is functioning at level 1. Overall, there appears to be a large segment of our province that has not attained the basic requirements for entry and retention within the job market. Participation in adult education programs on PEI is the lowest in the country at 22%. PEI also has the shortest average duration time for training (Rubenson, 2001a).

It seems clear that PEI has a significant literacy and academic credential issue within its workforce. Opportunities to increase literacy skills for those who have left the public school system are essentially limited to adult education programs, private companies, and community based tutoring. The financial cost associated with adult education programs curtails this option for many learners. Though the other two options appear more readily available, correlational information suggests there are significant barriers to accessing these alternatives. For instance, IALSS and Adult Education and Training Survey (AETS) data suggest factors such as low levels of education, unemployment, a labour market structure largely grounded on small firms in seasonal industries, and limited associated income reduce motivation to participate in further education. For PEI, all of these factors are present. Thus, efforts to engage low education/literacy adults in specific reading intervention programs or general educational upgrading processes prove challenging.

In fact, the degree of challenge was clearly demonstrated in recruitment difficulties observed in a study of a literacy intervention conducted on PEI in 2003 (McKenna, McMillan, & Dempsey, 2004). The authors described a variety of problems in recruiting 80 participants for literacy research. Obstacles noted were: 1) "competition" among service providers given that funding was generally attached to the participant; 2) the need for recruits to be Employment Insurance eligible; 3) the limited window of opportunity available for delivering the programs given the seasonal nature of employment on PEI; 4) potential participants were more interested in programs directly linked to employment rather than educational activities, while others were focused on attaining the GED and unwilling to dedicate time to what the client seemed to considered a secondary issue, and most significantly; 5) a lack of acknowledgement by low literacy adults about the extent of their reading difficulties. The later issue appeared most frequently.

The authors concluded that, ultimately, potential participants must see the relevance in order to engage in a literacy program (c.f. Rubenson, 2001b). Re-recruitment difficulties were also noted in a second phase of this study where participants in phase 1 either did not respond to requests for re-evaluation or opted not to participate (McKenna, McMillan, & Penner, 2006). Similar issues, related to such things as accurate perception of reading skill of low literacy individuals, and recruitment and engagement, have also been noted by other researchers (Buchanan, & Wolf, 1986; Long, 2002; Long, & Middleton, 2001; Scanlon, & Mellard, 2002; Sussman, 2003). Recruiting this population of potential learners is challenging given the gap between perceived and actual skill level (McKenna et al. 2004).

Despite the issue of recruitment there remains the question of how to best remediate low literacy levels and educational attainment within the PEI population. Given the degree of impact low literacy has across personal and societal domains, combined with the prevalence of low literacy adults within PEI, the need to provide effective interventions to those with limited literacy skills is apparent. Phonologically based programs are an intervention demonstrated to be effective in improving literacy skills with a variety of populations. However, there is relatively little research on poor reading in low literacy adults and subsequent remedial reading programs for adults, especially when considering the voluminous amount of research in this domain associated with children (Hall et al, 2000).

3.1   Low Literacy Adults

Despite the relative paucity of research with respect to the nature of the difficulties experienced by low literacy adults, evidence suggests the most significant issue is phonological processing - the same deficit area associated with children struggling with literacy. Durgunoglu and Oney (2002) sought to determine the cognitive processes of adult literacy acquisition by studying the progress of 59 women participating in an adult literacy program in Turkey. The program consisted of ninety hours of instruction. Unlike studies conducted in Western nations where participants have been exposed to formal education, this research was conducted on individuals who were essentially non-literate and having had very little exposure to printed material. Tests of letter recognition, word recognition, spelling, phonological awareness and

listening comprehension were used in pre-testing. Each of these, with the exception of the listening comprehension measure, was used in post-testing. Three additional post-tests were added, including two word recognition tasks and a measure of reading comprehension. Improvements were noted in letter recognition, word recognition, phonological awareness, and reading comprehension. Multiple regression analysis demonstrated patterns that replicated those found in child literacy acquisition, and suggests a similar developmental trajectory. The conclusion is literacy acquisition progresses in remarkably similar ways in children and adults.

In a study designed to compare the error patterns in word reading and spelling of reading level-matched adults and children, Greenberg, Ehri and Perin (2002) drew upon a sample of 72 adults in community adult basic education classes and 72 children from elementary schools in the same neighborhoods. The adults were considered to be low literacy level while the children were normally developing readers. Participants were required to undertake four tasks, sight word reading, non-word reading, spelling, and rhyme word detection. A fairly consistent pattern emerged where adults appeared to rely upon orthographic means to process words where the normally developing younger readers tended to rely on phonological skills. These results are consistent with research on school-aged struggling readers where it was demonstrated that poor readers would attempt to utilize orthographic knowledge in an effort to bypass their impaired phonological system (Felton, & Wood, 1992).

Using a combined case study and group differences design Ramus et al. (2003) evaluated the extent to which phonology; audition, vision, and motor deficits were present and contributed to reading difficulties with an adult sample. They used a small group of 16 dyslexic participants and 16 normal control participants. Both groups were administered a battery of tests that tapped into each of the constructs in question. Data were analyzed quantitatively and qualitatively. It was determined that a phonological deficit was present in all dyslexics in this sample and that phonology accounted for 76.1% of the variance, $F_{(1,30)} = 95.4$, $P < 0.001$. Audition accounted for another 4.2% of the variance, while other factors were not considered to be making a unique contribution. It was concluded that this study supported the phonological deficit model of developmental dyslexia, in general, and with adults.

A study utilizing imaging techniques during the reading behaviours of dyslexic and normally functioning adult readers attending university demonstrated the persistence of phonological deficits in dyslexic adults despite being academically successful and well compensated. The results indicated that both groups relied on a common distributed language system for word recognition but dyslexics showed an anomalous pattern of activation. In particular, it was shown that significant impairments were present for phonological processing tasks. It was concluded that the findings were consistent with the phonological core deficit model (Brunswick, McCrory, Price, Frith, & Frith, 1999)

Thompkins and Binder (2003) attempted to address the question of the degree of similarity between adults and children who are in the process of reading acquisition. They drew a sample of 60 adults from an adult basic education program that was in the process of improving their literacy skills. They drew a comparison sample of 99 children functioning at the same grade level as the adults in the domains of reading and spelling. Dependent variables included measures of phonological, orthographic and short-term memory. Results confirmed the importance of phonological awareness for adult readers and were consistent with findings from previous research with children. The authors suggested that adult literacy programs needed to help adults build skills in phonological decoding.

Though relatively sparse, there is sufficient evidence indicating a core deficit in phonological processing is present in adults who struggle with literacy acquisition. The core deficit is phonological processing for both children and adults (Felton, & Wood, 1992; Shaywitz, Fletcher, Holahan, & Shaywitz, 1992; Siegel, 1989; Vellutino, Scanlon, & Lyon, 2000, Bone, Cirino, Morris, & Morris, 2002). In addition, these conclusions have been supported by results gleaned from extensive literature reviews (Perfetti, & Marron, 1995; Kruidenier, 2002). In general, the current body of research indicates that phonologically based programs are the most efficacious interventions for reading difficulties for those who experience cognitive-linguistic deficits. In keeping with this research   the application of reading interventions to introduce the use of phonologically based remedial programs should be assessed.

3.2   Phonological Interventions for Adults

Though the majority of research on interventions has been performed with children there is accumulating evidence that similar programs are effective with adult learners. Reading interventions designed to address a phonological deficit typically share many characteristics such as instruction in letter-sound correspondence, syllable segmentation and blending, segmenting, substituting, adding and deleting individual phonemes (Chard, & Dickson, 1999). Reading interventions based upon phonological processing tend to be highly structured with logical and sequential organization of material, use of drill and repetition, have multi-sensory presentation of information, and utilize modeling and feedback. Despite the range of similarities some specific aspects of such programs may differ including but not limited to a) duration and intensity of intervention (e.g. 350 hours of training in Oakland Black, Stanford, Nussbaum, & Balise, 1998 versus 30 hours of training in McKenna, & Violato, 2003), b) the nature of visual props used (Chard, & Dickson, 1999), c) teacher-student ratio (Elbaum, Vaughn, Hughes, & Moody, 2000; Rashotte, MacPhee, & Torgesen, 2001), and d) means of delivering the program – teacher, video (Oakland et al., 1998). Even with these differences, programs that have been empirically tested typically lead to positive results in that students who received training out-perform students who do not receive training on measures of phonological awareness (Schneider et al., 2000). However, with the burgeoning of personal computers and their increased power, flexibility and affordability the use of computer delivered programming has begun to emerge as an area of intent interest. The issue of greatest concern is the difference in effectiveness of classroom based versus computer based program delivery, to explore this issue a brief review of the research literature with a focus on each area will be presented.

3.3   Classroom Delivered Phonological Interventions

The use of classroom based instructor lead interventions has been most widely studied with the vast majority of research undertaken within school-aged samples. For instance, Uhry and Shepherd (1997) studied a phonological training program that provided explicit phonics and phonological awareness instruction, while exposing the school aged participants to

literature immediately, so they could use the developing skills in context, through shared reading of books. The program consisted of approximately 32 hours of training offered in one-hour sessions over a two-week period. Significant gains in phonological awareness (F(2) = 3.53, p < .05) through improved reading of real and non-words was noted.

Lovett and Steinbach (1997) compared the progress of reading disabled students, using two different remedial programs and a no treatment control. Both reading programs shared the core features of intensive systematic word identification training to enhance decoding, word identification and vocabulary. The primary differences between the two programs were the size of the sub syllabic unit that was emphasized and the use of metacognitive strategies. Results were evaluated based upon measures of trained content, transfer of learning and, standardized measures of phonological processing, reading and spelling. In terms of the measures of trained content and transfer of learning both reading groups out performed the control group (p's < .001), with the group using larger sub syllabic units and metacognitive strategies, for the most part, outperforming the group using only phonological strategies (p < .05 and p < .001). In general, the metacognitive strategies in combination with the metalinguistic strategies seemed to equip students to more effectively attempt a wider range of English words including orthographically irregular words. In contrast, on measures of nonsense-word reading, the results were reversed, though once again both reading groups exceed the control group. In general, both groups acquired enhanced reading abilities. Comparable results were found in a study utilizing the same programs and similar design (Lovett, Steinbach, & Frijters, 2000).

McKenna et al. (2004) conducted a study where low literacy adult participants were enrolled in a phonologically based reading program to assess the impact such a program would have on basic reading skills. Utilizing a classroom-delivered instructor led remedial program that consisted of 60 hours of instruction with small groups of adults with similar levels of functioning it was demonstrated that most participants improved their literacy skill to a significant degree. This included improvements on word reading, non-word reading, and reading comprehension. Moreover, it was demonstrated that significant improvements were accrued in the area of self-esteem. The authors concluded that phonologically based programs

could be beneficial to low literacy adults in terms of enhancing reading skill and self-esteem using a short intensive program.

Research related to the remediation of reading disabilities suggests that the foundation of any successful program must be phonological. Despite the fact that most of this research has been conducted on samples of school aged children there is evidence from research on adults that the same cognitive-linguistic deficits are the primary factors in adult struggling readers (Fowler, & Scarborough, 1993; Perfetti, & Marron, 1995). Literacy programs grounded in phonological skill development are effective when compared to exposing students, adults and children, to educational materials without a systematic intervention (Torgerson, Porthouse, & Brooks, 2003). According to Sheehan-Holt and Smith (2000) in reference to literacy programs generally, "… there is little persuasive evidence available regarding learning outcomes (i.e., increased literacy proficiencies and reading practices) among participants in these [basic skills education] programs" (p. 226, square brackets added). It appears that phonologically based interventions tend to be the most effective interventions with low literacy adult learners. However, this conclusion is based upon a qualitative review of a small amount of published research. Unfortunately, an attempt at a meta-analytic review of this research was unsuccessful due to the small number of studies, the differing intervention strategies, the different samples used and a number of methodological concerns (Torgerson et al., 2003). Nonetheless, results from the above cited works taken together with the research on children is highly suggestive (cf. Kruidenier, 2002).

It appears that adults with low literacy skills experience a deficit in phonological skills, much the same as in school-aged populations. Given this, remedial approaches for the adult population, as with the school-aged population, require an approach that is solidly grounded in phonological processing. The continued enhancement of the personal computer to deliver phonologically based reading programs has begun to be explored as a means of increasing program efficiency.

3.4   Computer Delivery

The lure of computer based delivery of phonological programs appears largely predicated on two factors; first, economy and efficiency of delivery; second, the self-directed learning level specific (cf. Hall, Hughes, & Filbert, 2000). However, only recently have personal computers acquired the technological requirements to effectively deliver this type of programming (National Institute of Child Health and Human Development [NICHD], 2000). As such, the body of research in this area is limited with focus on school-aged samples. Results from these research studies are informative given the similarity between adults and children core deficits associated with reading difficulties,.

According to the Technology Sub-committee of the National Reading Panel (National Institute of Child Health and Human Development [NICHD], 2000) there has been relatively little systematic research into the use of computers for reading instruction despite current intense interest in computer technology. The authors noted it was extremely difficult to make specific instructional conclusions due to small sample sizes of experimental research. One conclusion was drawn, that it is possible to use computers for reading instruction given all the studies reviewed reported positive results. Since that time a number of studies have been performed, again primarily with school-aged samples, that reinforce the utility and effectiveness of computer based delivery of reading instruction.

Segers and Verhoeven (2005) undertook a study of the differential influence of computer based training of phonological awareness on children of differing ethnicities. In their study children worked for 15 minutes per week during one school year with a computer based phonological program. Results indicated no effects were measurable for auditory blending or phonemic segmentation. However, the intervention demonstrated significant positive effects for immigrant children on rhyme. There were also positive effects for grapheme knowledge and most importantly on early literacy in the first grade.

In another study Howell, Erickson, Stanger and Wheaton (2000) investigated the benefits of computer based training with children at risk for reading failure. The program was considered a balanced approach to reading instruction and consisted of 30-minute sessions for 4 days each week, which resulted in a total of 32 hours of instruction through the course of the

study. Results indicated improvements were made in the basic areas of interest including greater phonological awareness as measured by onset-rime knowledge, word identification skills, writing and developmental spelling. The authors concluded by stating that reading instruction provided by a carefully constructed computer based program can be highly effective in increasing the skills of children at risk for reading failure.

Fasting and Halaas Lyster (2005) investigated the effect of a computer based intervention on the enhancement of skills in below average readers and spellers in grades 5, 6, and 7 using a computerized intervention for 20 minutes per day, every school day for seven weeks, which focused upon supported text reading. Results indicated improvement in word reading, reading comprehension and spelling occurred and boys made the greatest gains. It was suggested that the computerized program may be best used in conjunction with teacher directed learning rather than in isolation. This contention was supported through pupil feedback who expressed the teacher was perceived as an important factor in success and for integration of the computerized support into the curriculum.

A study of 8 secondary school participants with severe learning difficulties, explored the effectiveness of a computer intervention on the development of reading skills (Lynch, Fawcett and Nicolson, 2000). The intervention comprised of three weekly 20-minute sessions over a 10-week period. Significant improvement was observed for participants in the areas of reading (word attack, fluency and comprehension) and spelling. The authors concluded that this computer based system may prove more effective than traditional methods of instruction. In a related study with a younger sample Nicolson, Fawcett and Nicolson (2000) utilized three groups 1) a control, 2) a classroom intervention only, and 3) a combined classroom and computer intervention. Though significant improvements were made with both modes of intervention, there was no significant difference between the classroom-based intervention and the combined classroom and computer intervention. Two issues were noted, 1) the computer system was used in tandem with teacher lead instruction, rather than as a stand-alone replacement and 2) the combined program was more cost effective, than teacher alone approach. Similar success with computer based interventions was noted by van Daal and

Reitsma (2000), and Mioduser, Tur-Kaspa and Lietner (2000) when using a computer intervention with beginning readers.

Hall, et al. (2000) conducted a research synthesis on the use of computer-assisted instruction (CAI) in reading for students with learning disabilities. They focused on research between 1980 and 1997 and employed an experimental or quasi-experimental design. A number of observations were made. First, delivery of CAI ranged from 1 to 50 sessions and length of sessions ranged from 10 to 40 minutes; most studies had between 5 and 20 sessions of 15- 20 minutes durations. Second, authors of the reviewed studies typically encourage the use of CAI in conjunction with teacher lead classroom activities rather than as a replacement for teachers. Third, well-developed software incorporated key aspects of teaching reading such as drill and repetition, systematic instruction and elaborated correction. In all, the authors supported the use of CAI in the classroom as a means of enhancing the reading skills of those with low levels of literacy.

Despite the relatively sparse research literature on computer based reading interventions the bulk of work that is available appears to lend itself to interpretation that these interventions tend to have a positive influence on the reading skills of those who participate in them. Moreover, two additional themes emerged through this review 1) contact with the computer intervention tended to be for relatively short periods 15-30 minutes per day and 2) interventions may be best used in conjunction with teacher lead instruction rather than as a replacement for teacher instruction.

3.5   Summary

Despite limited research using adult samples a number of conclusions may be drawn from research literature. Low literacy levels with adults are clearly associated with unemployment, under-employment, economic disadvantage, and an increased reliance on programs associated with the social safety-net. These issues "spill-over" into the community into economic costs associated with poor literacy. These costs are enormous links between the literacy level of communities/regions and overall economic development opportunities.

Recruitment difficulties are the most significant factor in provision and delivery of adult literacy programming. Studies identified this factor directly, indirectly, and consistently noted challenges associated with recruitment. Explanations associated with this difficulty have been varied, though likely the most significant of these is the observation that adults with low literacy levels consistently provide self-ratings of reading skills higher than actual abilities. This ties into engagement and interest in participation because if they assume or believe they have average abilities, they will not see the value in participating in a program designed to enhance basic literacy skills.

Adults struggling with literacy typically experience difficulties phonological skills with research consistent with the phonological core deficit model. Given a core deficit, interventions that target this domain have demonstrated greatest efficacy in remediating difficulties. Computer based interventions have demonstrated success in assisting the development of basic reading skills in school-aged samples.

Given these conclusions, a significant gap in research literature becomes apparent when considering adults with low levels of literacy. This gap concerns the use of computer based reading instruction to enhance the reading skills of adult learners. As such, this study is designed to answer the following questions:

1. What is the influence of the two structured reading interventions on preparation and attainment of GED?
2. Does participating in the reading interventions influence the length of time to prepare for and attain GED?
3. Does participating in the reading interventions affect scores on the GED examination?
4. Is there a difference between the two programs, classroom -vs- computer, on participants' reading skills?

4.   Study Context

4.1   Literacy Levels, Economic Base and Culture

PEI is Canada's smallest province with a population of approximately 135,000. The four primary industries are agriculture, fishing, forestry and tourism; all of which share, at least, two common denominators, 1) ability to be productive using relatively low skilled and poorly educated workers, and 2) seasonal nature of the industries. These factors lead to high unemployment rates and greater dependence on government social support networks, such as Employment Insurance and Social Assistance. In turn, these issues contribute to poor levels of school attainment and literacy development.

To illustrate, Statistics Canada 2001 Community Profiles for PEI indicated 20% of the total population aged 20-34 have less than a high school diploma. This percentage increased as the cohort age increased to a high of 36% ages 45-64. These numbers tend to exceed the national average. McMullen (2005) observed those who leave school early tend to demonstrate a steeper decline in literacy skills as they age, compared with the university educated group where declines in literacy skills occur gradually. This decline would suggest many adults who enter a GED preparation program may have weak literacy skills.

From a research perspective there are many benefits to conducting a study in PEI, namely, the "natural" controls in place for potentially confounding variables given the homogeneity of the PEI population. The urban-rural split is close to 50%, the over 80% having English first language status of residents. With 11 centers and two large urban centers, ACE programming is recognized as learner centered and community based with the additional benefit of ACE's presence in all regions of PEI. As part of Holland College, ACE is affiliated with the provincial community college. Participants in ACE programs are allowed special application status to Holland College postsecondary programs. The strong positive relationship Holland College has with each community and its reputation for providing services to all levels of learners creates an environment conducive to accessing learners for literacy research.

5.   Methodology

5.1   Instruments

Instruments used in this study were: a) Woodcock Johnson Tests of Achievement, Third Edition (WJ-III), forms A and B, Passage Comprehension (WPC), Word Identification (WID) and Word Attack (WA) subtests; b) GED Readiness Test (GEDRT), Canadian forms A and B and c) Participant Questionnaire (PQ) (See 5.3).

Woodcock Johnson Tests of Achievement, Third Edition (WJ-III): The WJ-III is a comprehensive, individually administered test of achievement that can be used with children, adolescents, and adults ranging in age from 2.0 through 90+. It was nationally normed and standardized using a stratified random sample in the United States of America (USA) on 8,818 individuals and includes normative information on age and grade based standard scores, percentiles and so forth (McGrew, & Woodcock, 2001). It is a theory-based test that contains subtests designed to assess reading, writing, mathematics, oral language, handwriting, recall and academic knowledge. It has two forms (Form A and Form B) that are parallel in content. Each form contains 22 subtests (Mather, & Woodcock, 2001). For the purposes of this study, the WPC, WID and WA subtests of the WJ-III were used. These subtests were chosen since reading, from the simple view, consists of two components decoding and comprehension (Gough, & Tunmer, 1986). As such, measuring these two factors would provide a reasonable evaluation of reading skill.

According to the WJ-III Examiner's Manual (Mather, & Woodcock, 2001) the WPC subtest's items (relevant for this study) require the participant to read a short passage and identify a missing word that makes sense in the context of the passage. The items become increasingly difficult. The median reliabilities for this subtest for the 5 – 19 age range is .83 and for the adult range .88.

The WID subtest measures word identification skills by having the participant read lists of English words that get progressively more difficult. The individual is not required to know the meanings of any of the words. The median reliability is .91 for the age range from 5 – 19 and .94 in the adult range (Mather, & Woodcock, 2001).

The WA subtest assesses the ability to apply phonetic decoding and structural analysis skills to the pronunciation of unfamiliar words by reading a list of non-words that comply with English orthography. The median reliabilities for this subtest for the 5 – 19 age range is .87 and for the adult range .87 (Mather, & Woodcock, 2001).

The accumulated data from studies on the validity of the WJ-III, including content, developmental patterns of scores, internal structure, and relationship to other variables, suggest that these subtests adequately measure the achievement constructs they were designed to measure. Correlations of the WJ-III reading scores with the Wechsler Individual Achievement Test, second edition, reading scores ranged from .79 to .82.

GED Readiness Test (GEDRT): The GEDRT is designed to reflect the type of questions and content found on the formal GED examination, albeit in a shorter, time saving, format. The content of the tests reflect the major outcomes of regular high school study. The GEDRT consists of 6 separate booklets each of which measure functioning in a separate domain: Language Arts/Writing, Language Arts/Reading, Social Studies, Science, and Mathematics (2 booklets, one where a calculator can be used and one where no calculator is allowed). Two equivalent forms, A and B, of the test are available. Test content was developed through the test specification committee based upon industry expert nomination of curriculum. A multiple choice format is used in each of the test content areas with the exception of 1) a Writing Test that is part of the Language Arts/Writing test which requires the candidate to write an expository essay and 2) 20% of the problems on the Mathematics Test where candidates are required to generate a numerical answer to questions. The test includes questions that require the abilities to apply, analyze, synthesize and evaluate information. Moreover, interpreting visual text is an important component of the test (The GED Testing Service, 2000).

The test is group administered with number of questions and time limits for each section as follows: 1) Language Arts/Writing – Part 1 – 25 multiple choice questions; 38 minutes, Part 2 – candidate-generated essay; 45 minutes, 2) Language Arts/Reading – 20 multiple choice questions; 33 minutes, 3) Social Studies – 25 multiple choice questions; 35 minutes, 4) Science – 25 multiple choice questions; 40 minutes, 5) Mathematics – Part 1 – 13 multiple choice questions and calculation responses; 23 minutes, Part 2 12 multiple choice

questions and calculation responses; 22 minutes. Reliability of the test ranges from .83 on the Language Arts-Reading component of form A, to .93 on the Language Arts/Writing of form B. Validity is based upon equating to the official GED examination using the equipercentile method (The GED Testing Service, 2000).

The testing design was pretest, post-test (time 1) and post post-test (time 2). The pretest occurred prior to the participant starting the GED program. Generally, the pretest occurred within one week of the participant's start date. Time 1 post-test occurred within 60 hours of the classroom based phonological processing intervention. At each testing time, specific structure for test delivery was followed. The GEDRT has a test A and B as does the WJIII. Therefore, where a participant was tested at pretest with Test A of GEDRT, Test A of WJIII was also utilized. For the following post-test, Test B GEDRT and Test B of WJIII were used. At the final post post-test, the examiner would go back to Test A for both GEDRT and WJIII. This provided alteration of the test to assure measured improvement was not a function of becoming familiar with the test.

5.2   Participants

One hundred and one students ranging in age from 18 to 71 years old with a mean age of 33.5 years (S.D. 11.78) were recruited to participate in this study. Fifteen participants had missing data which lead to their test results being dropped from the analysis. Reasons for missing data varied from issues of poor attendance, through to administrative/logistical errors on the part of the researchers. Complete data were available for 84 participants from pre-test to post-test, time 1, and data for 56 participants were available for post-test, time 2, for the reading measures. For GED readiness testing complete data were available for 86 participants from pre-test to post-test, time 1, and data for 62 participants were available for post-test, time 2. Independent t-tests on the basic reading and total GED pre-test measures of the participants with incomplete data in comparison with those who had complete data showed that a significant difference was present on the GED total score, $t = -2.62$, $p < .01$, and trends toward differences on WA, $t = -1.88$, $p < .06$, and WID, $t = -1.88$, $p < .06$. In each case the missing data

group had higher pre-test scores. Though no trend was present it was also noted that the mean for the PC test was higher in the group with missing data.

Individuals were recruited as they registered for the GED preparation program in Charlottetown or Summerside, PEI. These two locations have the largest number of participants in adult education programs of the 11 adult education centers across the province. Located on the application form for the GED program was a section where learners could indicate an interest in participating in research projects. A brief description of the study was provided at the time the application form was picked-up and the section on the application relevant to participation was pointed out. An instructor or the manager from the Adult Education section of Holland College contacted those who endorsed this item. A brief description of the nature of the study and its potential benefits and drawbacks was presented (see Appendix A). Those who indicate an interest in participating were provided with a letter that described in detail the study, and a consent form (see Appendix A). Signing the consent form led to enrollment in the study. An approximately equal number of participants enrolled at each of the centres with 53% enrolling at centre 1 and 47% enrolling at centre 2. Forty percent of participants were male and 60% were female.

Participants were randomly assigned to 1 of 2 interventions, classroom-based reading intervention, computer based reading intervention, or to a comparison group. The interventions were phonological processing delivered either through a classroom, teacher oriented approach, or independently through a computer assisted program. The comparison group was assigned directly into GED preparation classes. This classroom is self paced with continuous intake and exit. Students work through the five academic areas of the GED test: math, science, social studies, reading and writing.

Given ethical concerns in delaying a person's entry into a program of study solely for the purpose of research and the seasonal nature of employment in this region; there was a limited window of opportunity to pursue educational endeavors, therefore, a no formal " no-intervention" group was established. The structure of the GED preparation program is one of continuous intake and exit. In contrast, the classroom-based intervention had fixed start and finish times. As a result, once the classroom intervention started other participants were

randomly assigned to one of the other 2 conditions. Once again issues with delaying enrollment were paramount in this structure.

5.3   Participant Questionnaire (PQ)

The PQ provided demographic data for further comparisons within this study. As such it had been adapted from a Labour Force Questionnaire utilized in a previous study with low literacy adults (Mckenna, McMillan, & Dempsey, 2004). This background information included education, employment, family, health, goals, and beliefs/behaviours histories known to be related to literacy achievement. Questions were based upon a variety of sources including a survey used as part of the Ready to Learn Program (Human Resources Development Canada, 1995), Finucci's (1982, cited in Lefly, & Pennington, 2000) Reading History Questionnaire, and a review of research associated with measuring the relationship between adult education/literacy and employment (Buchanan, & Wolf, 1986; Haring, Lovett, & Smith, 1990; Hellendoorn, & Ruijssenaars, 2000; Hoffman et al., 1987; Malcolm, Polatajko, & Simons, 1990; White, 1992; White et al., 1983) as well as a review of research related to large scale surveys such as AETS, NALL and IALSS (Baran, Berube, Roy, & Salmon, 2000). Professionals who work with adult learners with low literacy skills reviewed initial drafts of the questionnaire. Adjustments were made to the content and style of questions based on their feedback. The modified version was then administered to 4 adult learners with low literacy skills who volunteered to participate. Further, refinements were made to the instrument based upon participant reaction and feedback. Psychometric data was not developed; however, based upon professional feedback it appears to have content validity. The PQ consisted of 16 questions drawn from the LFQ. In this case there were 7 questions related to education, 3 related to employment and 6 related to beliefs and behaviours about reading (see appendix B).

5.4   Intervention and Comparison Programs

Two reading remediation programs were used in this study. The first was a classroom-based, small group delivered program, Literacy Links; the second was the Reading Horizons computer delivered program. Both the Literacy Links (LL) and Reading Horizons (RH) programs

incorporate the essential features, as outlined by Chard and Dickson (1999), of phonologically based approaches to remediation including a) explicit instruction in simple letter-sound correspondence, b) gradual progression to more complex combinations, c) syllable segmentation, d), blending, segmenting, substituting, adding and deleting individual phonemes and e) recognition of common spelling patterns. The programs also involve a) a systematic progression in concepts; b) multi-modal instruction; c) the use of listening and speaking to reinforce concepts; d) teacher (for LL and computer for RH) modeling, e) mastery learning (planned repetition and revision), and f) the use of reading and writing to develop skills. Each of these features has been associated with successful remedial programs (McKenna, 2003; Piotrowski, & Reason, 2000).

Both programs utilize a variety of techniques from other teaching approaches. For instance the LL program uses a) meta-cognitive instruction, including the use of mnemonics, and b) whole word/language approach, like development of a foundation of sight-words, effective use of literature and reading in context. Meta-linguistic strategies are also used. Examples of these strategies include, a) word identification by analogy (e.g. focus on rhyming and abstraction of rime patterns), b) flexing (e.g. using vowel variations whereby students are encouraged to attempt different vowel sounds and choose the one that results in a real word) and c) learning to find the root-word (where students are encouraged to remove the affixes from unknown multisyllabic words to ease decoding). The RH program integrates such tasks as instruction in spelling, vocabulary, grammar, sentence structure, and dictionary skills. It also encourages the flexible approach to decoding vowels with variant vowel spelling patterns and with variant pronunciations, as well as learning the meanings of affixes to facilitate decoding of words containing prefixes and suffixes. The other significant component to the RH program, given its mode of delivery is that students receive immediate corrective feedback.

The LL program requires a minimum intervention length of 30 hours and was designed as a one-to-one program. However, in this and in other studies the intervention time was extended to 60 hours to account for the small group format of instruction. The RH program is self-paced so the time for delivery varies from one learner to the next, though a timeframe of 25-30 hours of instruction would generally lead to completion of all components of the

program. In the LL condition remedial instruction was undertaken using a small group format of five or 6 participants. According to Elbaum, Vaughn, Hughes, and Moody, (2000) and Rashotte, MacPhee, and Torgesen, (2001) the use of small groups versus individual instruction does not appear to affect outcomes. Burnette (1999) noted in a review of research that small groups of 3-10 helped students learn more compared to larger classes. In addition, Vaughn, Linan-Thompson, Kouzekanani, Bryant, Dickson, and Blozis (2003) compared the progress of students in a reading program based on group sizes of 1:1, 1:3 and 1:10. It was demonstrated that groupings of 1:1 and 1:3 tended to outperform those in groups of 1:10. However, on some measures including word attack and fluency there was no difference between the 1:3 and the 1:10 groups. This suggests that small groups of similar size will likely not differ in terms of reading outcomes.

In short, the goal of the LL program is to provide students who are experiencing difficulties with a solid foundation of fundamental skills using intensive programming. This is accomplished by utilizing a range of approaches to reading development such as solid grounding in phonological methodology, with supplemental elements from whole word/language and meta-cognitive strategies. The RH program has similar goals with the program lending itself to flexible use in multiple situations including a supplement to a school's core reading program, as extra support to students who are reading below grade level, and as a remediation tool for older students reading below grade level. The goal of the program is for students to learn the phonic elements to master so they will become fluent readers and spellers. In both programs, despite some variation in supplemental elements, the primary focus is on explicit instruction of phonics principles using sound empirically validated approaches (see McKenna, 2006; McKenna et al. 2004, McKenna, & Violato, 2003 for empirical validation of the LL program, see www.readinghorizons.com/research/index.aspx for empirical validation of the RH program). The key difference between the programs is the mode of delivery, teacher led classroom instruction or computer facilitated instruction.

The GED preparation program is offered through ACE at Holland College. The comparison group was enrolled in regular GED preparation. It is structured as a classroom based, teacher-delivered program that is self-paced according to the individual learners need.

The program follows a continuous intake and exit format. It is designed to prepare learners to write the GED examination. Areas of study match those on the GED examination and include Language Arts/Writing, Social Studies, Science, Language Arts/Reading and Mathematics. Classes varied in size from 12-15 students with each class having one primary instructor. Instruction typically consisted of 6.0 hours per day over the course of a 5-day week. Total number of instructional hours ranged from learner to learner as per the continuous intake/exit format of the program. Within this setting language arts/reading and mathematics are typically the first items to be addressed in the classroom by the instructors.

5.5 Teacher/Facilitator Training

General educational/professional background of teachers included a degree in education from a recognized degree granting institution as well as being certified in the province of PEI. All instructors had a minimum of 5 years teaching experience in the GED preparation program. In addition, LL teacher training consisted of approximately 20 hours of instruction delivered over 2 days. Instruction involved a: 1) general introduction to the program, 2) review of the LL materials and lesson plans, 3) specific review of each lesson's scope and sequence, 4) modeled administration of select elements, 5) practice delivery of partial and complete lessons and 6) question period. Training had originally taken place as part of a previous study (McKenna et al., 2004). Since that time the teachers had delivered the program on at least 4 occasions to a variety of age groups.

Facilitators of the Reading Horizons intervention were provided with on-line training and support from the publishers of the program, an in-person presentation by a company representative, and self-directed exploration of the computer program, for a total of approximately 2 hours of familiarization training. Facilitators reported being satisfied with the training and self-directed experiential learning and noted, given the well designed nature of the program, to have been adequately prepared for student enquiries.

5.6   Data Collection

Following informed consent and group assignment pre-testing began. The teachers of the programs administered the various tests. All had experience with standardized testing and each had attended a workshop on the administration of the WJ-III; given previous experience with testing of this nature and with the GED readiness testing in particular, all demonstrated competence in administration. Care was taken to ensure that no post-testing of participants was completed by their own instructor.

The PQ was self-administered with the instructors being available to answer questions or provide clarification. The WJ-III test was administered in a quiet well lit room. The GEDRT was group administered according to standardized procedures. Alternate forms of the WJ-III and the GEDRT were available and delivery was counterbalanced.

Pre-testing was generally completed on each participant no more than 1 week prior to entering the classroom. Post-testing, time 1, occurred after approximately 60 hours for the LL, and comparison group, but the RH group was tested when the reading program was completed. The RH completion rate varied with each individual. The average time was 21.5 hours with a range of 3 to 36 hours. Post post-test time 2, was completed when all participants were ready for the formal GED test or at the end of the academic year.

Each participant was assigned a research number to ensure anonymity and this was used on all data collection and analysis. All administration and scoring of the assessments were conducted according to the directions provided in the technical manuals.

5.7   Data Analysis

Data collected was entered into an Excel computer file. These data were than transferred to SPSS 15.0 for windows. The analysis consisted of both descriptive and inferential statistical procedures. The inferential statistical procedures included a multi-variate analysis of variance (MANOVA) repeated measure design. Statistical significance was determined upon a minimum alpha of .05. The purpose of the data analysis was to, 1) determine the influence the two structured reading interventions had on preparation and attainment of GED, 2) measure the impact of participating in a reading intervention on the length of time to prepare for and

attain GED, 3) assess if participating in a reading interventions affects scores on the GED

examination; and 4) evaluate if there is a difference between the two reading programs,

classroom -vs- computer, on participants' reading skills. In addition, select a priori correlations

between reading measures and elements of the PQ were performed, as were *a postori*

exploratory analysis of the psychometric data as a means of further elucidating the results.

6.   Results

Results are presented using frequencies and frequency analysis. Selected *a priori* correlational analysis is used to describe the relationship between some of the PQ and psychometric variables. Analysis of the psychometric data is performed using multivariate analysis of variance repeated measures design. Frequencies and correlations are used to develop a profile of the participants. Analysis of the psychometric data answers the stated research questions and to allows *a postori* exploratory analysis of data.

The PQ can be divided into 4 sections related to 1) basic demographic information, 2) education, 3) employment, and 4) reading. Frequencies do not necessarily sum to 100 percent due to missing data. The basic demographic information was reported in the Methodology Chapter under Participants.

Issues associated with education are of particular relevance given the focus of this study. Almost 15% of the sample had terminated formal schooling while in grades 6, 7 or 8. Approximately 63% completed grades 9 or 10 before leaving school, while nearly 18% attended grade 11 and only 2% completed grade 12. It was also noted that just over 60% of the sample had repeated at least one grade while in school.

Reading specific questions were also presented. When asked to rate their reading ability almost 18% of the sample rated their reading ability as poor or very poor. Approximately 40% rated their reading skill as average and a little over 41% rated their reading skills as higher than average. Self-rated attitude toward reading was also measured. Just over 64% of participants rated their attitude toward reading as good or very good, while almost 8% indicated a poor attitude toward reading, and the remainder expressing a neutral attitude.

In addition, teachers were asked to rate each participants attitude toward the program in which they were enrolled. Fifty-two percent of participants were rated as having an average attitude toward the program and 23% were rated as having a negative or very negative attitude. The remaining 17% were rated with positive or very positive attitudes.

A priori correlations were performed to explore relationships between the PQ data and the psychometric data. Correlations between self-rated reading ability, self-rated attitude and reading skills (WID, WA, PC) at pre-test demonstrated a positive and significant relationship

between self-rated reading ability, word reading, $r(98) = .42, > .001$, and word attack $r(98) = .33, > .001$; and self-rated attitude toward reading and word reading, $r(99) = .46, >.001$. There was also a positive significant relationship between self-rated ability and attitude, $r(99) = .22, >.03$. The relationship between reading skills and grade attained and grades failed at school showed no relationships with probabilities ranging from .23 to .66. Interestingly, a significant positive relationship was noted for teacher rated attitude during the program and performance on pre-tests of reading WID $r(92) = .36 > .001$, WA $r(92) = .29 > .06$, PC $r(92) = .24 > .02$; post-test time 1 WID $r(81) = .39 > .001$, WA $r(81) = .25 > .02$, PC $r(81) = .30 > .007$; and post-test time 2 for WID $r(55) = .40 > .002$, but not for WA $r(55) = .19 > .17$, or PC $r(55) = .19 > .15$.

A preliminary analysis of data was undertaken in order to explore possible teacher and test order effects. A one-way multivariate analysis of variance[1] (MANOVA), repeated measures, with scores from WID, PC, WA and the GED readiness test total score as within-subject factors and the between subject factors being reading teacher, GED instructor and test order. Results of the omnibus measure for reading teacher, Wilks' Lamba = .16, $F(48, 97.6) = .92$, $p < .63$, GED instructor, Wilks' Lamba = .47, $F(24, 55.7) = .47$, $p < .84$ and order of test, Wilks' Lamba = .65, $F(8, 19) = .65$, $p < .31$ indicated there were no significant differences between teachers or based upon test order, neither was there any interaction among these factors.

Due to limited sample size 3 separate MANOVA were run to analyze the data in reference to the research questions.

Question 1, regarding the influence of the two reading interventions on preparation and attainment of GED, was divided into two separate analysis, the first a one-way repeated measures MANOVA to assess the influence of the reading intervention on preparation for the GED; the second a one-way MANOVA to determine if the reading intervention had affected attainment of the GED. In both cases the analysis was structured so as to address Question 2, regarding the length of time to prepare and attain the GED, by including time enrolled in the program as a between subject factor. The first analysis included 4 of the 5 components of the GED readiness test (science, social studies, math and writing) entered as within-subject factors

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[1] According to Stevens (1986) it is appropriate to utilize separate multivariate analysis in order to limit the degree to which real differences in the primary variables being investigated are obscured by those variables that are being analyzed for heuristic purposes.

and group assignment (e.g. intervention or comparison) and time in the program as the between-subject factors. Results of the omnibus measure indicates significant change across the 3 testing periods, Wilks' Lamba = .43, $F(8, 39) = 6.61$, $p < .001$. There was no interaction between testing and intervention, Wilks' Lamba = .67, $F(16, 78) = 1.1$, $p < .38$, and no interaction between testing and time in program, Wilks' Lamba = .63, $F(16, 78) = 1.3$, $p < .23$. Univariate analysis indicated that significant change had occurred in each of the 4 areas measured with probabilities ranging from .05 to .001. See table 1 for an outline of these results.

Table 1 Univariate analysis by subject area

Subject Areas	F	Significance
Science	3.2	.04
Social Studies	4.6	.01
Math	19.1	.001
Writing	7.5	.001

The second analysis, related to question 1 to determine the influence of the reading interventions on attainment of the GED and question 2 regarding time to completion of the GED was performed. A one-way MANOVA with pass/fail designation for each component of the GED examination used as the within subject factor, group assignment as the between subject factor, and time in the program as a covariate. Results indicate no significant difference between groups for those attaining a passing mark in the GED versus those who did not Wilks' Lamba = .90, $F(8, 110) = .78$, $p < .63$ and no effect for the time in program Wilks' Lamba = .93, $F(4, 55) = 1.1$, $p < .38$.

The more specific question, Question 3, to assess if participating in a reading intervention affects scores on the GED examination (not necessarily passing), was also completed using a one-way MANOVA, with final GED score on each component of the GED examination as the within subject factor and group assignment as the between subject factor. Results demonstrate no difference between groups with respect to scores on the various components of the GED examination, Wilks' Lamba = .95, $F(10, 116) = .33$, $p < .97$.

Evaluating whether there is a difference between the two reading programs, classroom -vs- computer, on participants' reading skills development, question 4 was assessed by a one-way MANOVA, repeated measures design for the three measurement points (pre-test, post-test time 1 and post-test time 2) with WID, PC, WA and the reading component of the GED readiness test entered as the within-subjects factors and group assignment as the between-subject factor. Results demonstrate that significant change in reading skills occurred across testing periods, Wilks' Lamba = .54, $F(8, 45)$ = 4.77, $p < .001$. Univariate analysis indicated that significant change had occurred in 3 of the 4 areas measured, WID, PC, WA, with probabilities ranging from .05 to .001 and a trend toward significance on the GED reading measure with a probability of .07. See table 2 for an overview of these results. There was also an interaction between testing and intervention, Wilks' Lamba = .45, $F(16, 90)$ = 2.79, $p < .001$. Univariate analysis indicated that an interaction was present on the measure of WA, $F(4, 104)$ = 4.09, $p<.006$. A review of the means suggested that the Literacy Links intervention had the greatest influence.

Table 2 Univariate analysis by reading measures

Reading Measures	F	Significance
WID	9.4	.001
PC	3.1	.05
WA	10.8	.001
GED Read	2.8	.067

In order to better understand the results a series of follow-up analysis were performed. The first two follow-up analyses were performed in order to more clearly understand the pattern of improvement from one testing period to the next on performance on the GEDRT. In particular, to determine if differing patterns of improvement were notable from pre-test to post-test time 1 and then again from pre-test to post-test time 2. More complete data sets were available for the pre-testing to post-testing time 1, which may influence results. In

addition, it was considered possible that changes between these various testing periods may have been obscured by the analysis of the data as a whole from pre-test to post-tests times 1 and 2. A MANOVA, repeated measures design, was performed on the GEDRT and included 4 of the 5 components of the GED readiness test (science, social studies, math and writing): pre-test to post-test time 1 were entered as within-subject factors and group assignment as the between-subject factor. Results of the omnibus measure indicates significant change pre-test to post-test time 1, Wilks' Lamba = .33, $F(4, 80) = 9.69$, $p < .001$. Univariate tests indicated improvements occurred in Science, Math and Writing. No significant change in Social Studies was apparent. Results are presented in Table 3. Interestingly, no interaction between test period and group assignment was present, Wilks' Lamba = .90, $F(8, 160) = 1.13$, $p < .34$.

Table 3 Univariate analysis by GEDRT measures

Subject Areas	F	Significance
Science	12.0	.001
Social Studies	1.2	.28
Math	10.0	.002
Writing	22.9	.001

The second follow-up analysis related to the GEDRT was to assess change from pre-test to post-test time 2. The same analysis and factors were used. Results indicate significant change from testing periods, Wilks' Lamba = .40, $F(4, 58) = 21.8$, $p < .001$. Univariate testing revealed that changes had occurred in all 4 areas. See table 4 for details. Again no interaction between testing period and group was noted, Wilks' Lamba = .84, $F(8, 116) = 1.34$, $p < .23$.

Table 4 Univariate analysis by GEDRT measures (Post post-test)

Subject Areas	F	Significance
Science	17.0	.001
Social Studies	11.7	.001
Math	37.9	.001

Writing	29.5	.001

A similar exploratory process was undertaken with the data for the reading measures. A one-way MANOVA, repeated measures design was utilized with pre-test to post-test time 1 as the within subject factors and group assignment as the between subject factor. Results show a significant change from pre-test to post-test time 1, Wilks' Lamba = .78, $F(4, 77) = 5.41$, $p <$ .001, with a trend toward an interaction between testing and group, Wilks' Lamba = .83, $F(8, 154) = 1.94$, $p < .058$. Univariate F-tests indicated change in WID, $F(1, 80) = 10.1$, p<.002, and WA, $F(1, 80) = 14.5$, p<.001. The interaction was noted to lie primarily with WA, $F(2, 80) = 4.9$ p<.01, with a trend toward an interaction with WID, $F(2, 80) = 2.5$, p<.088. A review of the means suggested that the greatest change lay with those in the LL group.

Similar analysis for the reading measure from pre-test to post-test time 2 was undertaken with the same factors. Significant changes between testing periods was again noted, Wilks' Lamba = .59, $F(4, 49) = 8.47$, $p < .001$. Univariate F-tests determined change in all measured areas. Results are presented in Table 5.

Table 5 Univariate analysis by reading measures

Subject Areas	F	Significance
WID	20.7	.001
PC	5.5	.02
WA	14.1	.001
GED Read	4.6	.04

An interaction between test period and intervention was also noted, Wilks' Lamba = .58, $F(8, 98) = 3.86$, $p < .001$. The interaction was present on WID, $F(2, 52) = 4.07$, p<.02; WA, $F(2, 52) = 6.41$, p<.003; and the GED reading measure $F(2, 52) = 5.44$, p<.007. No interaction was noted with PC, $F(2, 52) = 1.28$, p<.29. A review of the means suggested improvements were more prevalent in 1) WID for those in the reading interventions, 2) WA for those in the LL group, and 3) GED reading measure for those in the LL group and the comparison group.

7.   Discussion

The importance of developing better remedial strategies and associated issue of lower levels of educational attainment with low literacy adults population is apparent given the impact of low literacy across personal and societal domains (Boothby, 2002; Charette & Meng, 1998; Gottesman, & Bennett, 1996; Green, & Riddell, 2001; Haring, Lovett, & Smith, 1990; Hoffman et el., 1987; McIntosh, & Vignoles, 2001; Shalla, & Schellenberg, 1998; Smith, 1997). This combined with the prevalence of low literacy adults both nationally and within PEI provides rationale for pursuing research in this purlieu. The focus of the present study was to investigate the influence of two-structured reading programs on preparation and attainment of the GED. It was specifically designed to answer the following questions:

1) What is the influence of the two structured reading interventions on preparation and attainment of GED?

2) Does participating in the reading interventions influence the length of time to prepare for and attain GED?

3) Does participating in the reading interventions affect scores on the GED examination?

4) Is there a difference between the two programs, classroom -vs- computer, on participants' reading skills?

A profile of learners was established through data collected on the PQ and some of this was explored using a series of *a priori* correlations with the psychometric data. Moreover some *a postori* exploratory analysis was undertaken as a means of developing a better understanding of the results from answering the research questions. A brief review of the learner profile will be provided, followed by the *a priori* correlational analyses between the PQ and the psychometric data. Data as relevant to the primary research questions will be addressed. The *a postori* exploration of the data will be presented to further elaborate on the main findings.

Data collected through the PQ indicated 15% of participants left school before reaching or after completing grade 8, 63% left after attaining grade 9 or 10, 18% attended grade 11 and only 2% completed grade 12. This is consistent with other research in this domain. McKenna et al. (2004) found approximately 50% of their sample had terminated public education by grade

10, 8% reached grade 11 and about 30% attained grade 12. A study of learning disabled (LD) adults by Malcolm et al. (1990) demonstrated similar findings with 43.8% of participants completing grades 11, 12 or 13. The present sample has smaller number of participants who attained grade 12 is likely a reflection of the research design where participants drawn from a GED preparation program select against those who had already completed high school. Almost 60% of participants in the present study reported repeating at least one grade while in public school. Again, this is consistent with previous research where 75% of participants (McKenna et al., 2004) and 58.8% of participants (Malcolm et al., 1990) repeated at least one grade while in the public school system.

When asked to rate their reading skills and attitude toward reading, 18% rated their reading ability as poor or very poor, approximately 40% rated their skills as average and the remainder rated their skills as above average. Correlations between self-rated reading ability and reading skill at pre-test found a positive and significant relationship between the basic reading skills of word reading and word attack and self-rated reading ability. This suggests participants had a good understanding of their reading ability. The distribution of self-rating of reading ability is similar to results reported by McKenna et al. (2004) where 66% of their sample rated their reading skills as average or better. That study there reported a disconnect between self-ratings and actual abilities. In the present study approximately 50% of participants were reading higher than grade 7, at the time of entry into this study. While reading at a grade 7 level is insufficient for functioning at a Level 3 literacy, the percentage of participants at grade 7 level was higher than originally anticipated by the researchers, which may have influenced results. In McKenna et al. (2004) most were reading below grade 7, or an elementary school range. It would seem plausible that as one explores the beliefs of those at the lower end of the reading distribution that the disconnection between perceived ability and actual ability becomes more apparent. This contention is indirectly supported by a number of studies (Berube et al., 2001; Meltzer et al., 2003; Sussman, 2003) that have noted this apparent lack of awareness in those with more limited reading skills.

It was observed no correlational relationship was present between variables such as highest grade attained and grades failed, and psychometric measures of reading skill at pre-

test. These results are in contrast to previous findings where a positive relationship was noted between repeating grades in school and pre-test measure of phonological ability (McKenna et al. 2004). This may suggest that many in the present study experienced difficulty in school, as measured by these proxy variables, did so for reasons other than deficits in reading related skills or that such deficits had improved.

A significant positive relationship was noted for teacher rated attitude during the program and performance on pre-tests of reading (WID, PC, WA) post-test time 1 (WID, PC, WA) and post-test time 2 (WA). It may reflect the instructors' ability to evaluate a learners' effort based upon perceived attitude and that effort translates into higher performance. Since instructors would have little knowledge and contact with learners at pre-test the relation between these variables it may suggest teachers retrospectively gauge learner attitude on performance. An alternative explanation may be that lower scorers *appear* to have a poorer attitude, irrespective of actual effort or attitude, as a result of their greater struggles in learning and behaviours associated with these struggles are misinterpreted by instructors.

The research questions were re-structured to facilitate data analysis. Determining the influence of the two reading programs on preparation for the GED and length of time for preparation were analyzed. Results were surprising in that change was noted across the 3 testing periods on each of the 4 measured areas, science, social studies, math and writing, but there was no interaction based upon group assignment or time in program. This suggests group membership had no influence on progress made in GED preparation and preparation time was not influenced by group assignment. To better understand these results *a postori* analyses were undertaken. In particular, exploration of patterns of improvement from pre-test to post-test time 1 and pre-test to post-test time 2 were performed to determine if differences existed between groups. It was noted from pre-test to post-test time 1 significant change had occurred on the science, math and writing tests. No change was noted on the social studies test. There was no interaction between group assignment and testing. Likewise, from pre-test to post-test time 2 there was change in all measured areas with no effect based upon group assignment.

It appears improvement in science, math and writing could be attained either by direct study of the topic areas or through improvement in reading skill. It is speculated that

improvement in these domains by those exposed to the reading programs may have been influenced by the participants' improved reading skill, which perhaps led to better comprehension of questions and answer options on the science and math components, as well as improvement in basic writing skills which lead to improvement in this domain. However, it is also possible that greater comfort with the culture of the classroom, including test taking, may have resulted in the noted improvements. The lack of improvement in social studies may reflect the nature of this material and the specific factual information that is required to answer questions. The lack of improvement in the comparison group in this domain is likely predicated upon the structure of the GED preparation program where English and Math skills are typically delivered first and therefore social studies may not have been addressed by the time the first post-test was administered.

The influence of the programming on GED attainment and time to complete the GED was evaluated. In this case it was observed that there was no difference in attaining a passing mark on any of the 5 components of the GED exam based upon group assignment and no difference in the amount of time spent in the program for those who attained passing marks compared to those who did not. This suggests that specific interventions related to basic reading skills did not influence success in attaining GED passing marks or reduce the overall time it took to prepare. This may be associated with the relatively high percentage of participants who were functioning at higher than grade 7 level upon entering the study, this is discussed below.

The issue of whether participation in the reading interventions influence GED scores was addressed with results indicating that group assignment did not influence final test scores. Again this may be an issue of the relatively large percentage of participants who were functioning at a higher than grade 7 level in terms of their literacy skills.

Evaluating differential effectiveness of the two reading programs, classroom versus computer delivered on reading skill development yielded a similar and surprising pattern of results. Significant change occurred in reading skills across testing periods and on the three measures of the WJ-III, WID, PC, and WA, with a trend toward significance on the GED reading measure. In this case there was an interaction between testing and intervention for the WA test

only. A review of the means suggested the greatest positive influence was with the LL group. This result suggests that reading skills improved in most of the tested domains to a significant degree regardless of participation in the reading interventions or regular GED preparation classroom. It was expected that reading skill would improve more significantly for those who participated in the reading programs compared to those who had been assigned to the comparison group (Sheehan-Holt, & Smith, 2000). Once again further exploration of the data was undertaken in order to better understand these results by comparing between groups from pre-test to post-test time 1 and pre-test to post-test time 2. In this case, significant change was noted between pre- and post-test time 1 with a trend toward an interaction (p<.058). Change occurred on measures of WA and WID with the trend toward interaction being noted most strongly with WA and somewhat with WID. Once again a review of the means suggested the greatest changes were with the LL group. Though the trend exists for greater change with the LL group, improvement was noted in all groups including the comparison group. The change being more focal to the WA and WID fits with the emphasis of the reading interventions though this does not explain change in these skills in the comparison group. It is possible, that given the relatively high percentage of participants who were reading above a grade 7 level upon entry to the program that the "use it or lose it" phenomena may be at play. That is, participants reading skills were simply weak as a result of their absence from formal schooling and likely a lack of exposure to basic reading principles and comprehension strategies. However, with enrollment in the comparison group, GED preparation, sufficient exposure to reading and implicit reading instruction resulted in a refreshing of their skill that culminated in improvement in performance on the reading measures. This interpretation fits with the recent round of international testing where the "use it or lose it" phenomena was noted (Desjardin, & Werquin, 2005; McMullen, 2005; Movement for Canadian Literacy, 2005).

A further exploration of the data from pre-test to post-test time 2 indicated significant change in all measured areas with an interaction based upon group for WID, WA and GED reading measure. In this case a review of the means suggested WID improved most for those in either of the reading interventions, WA improved most for those in the LL group, and for the GED measure improvement was strongest for those in the LL group or the comparison group.

Overall, the results do not paint a clear picture of one intervention providing greater benefits over the others. In addition, the multiple comparisons required to glean this information needs to be considered and cautious interpretation is necessary when evaluating differences. It is clear that improvements in reading are taking place, however, the effects of the reading interventions, though present, are not as strong as would be expected considering previous research using these or similar programs (Hall et al., 2000; McKenna, et al., 2004, McKenna, & Violato, 2003; National Institute of Child Health and Human Development, 2000). It does seem that the LL group displayed consistent trends toward greater improvements, in basic reading skills. Though a trend toward improvement was also noted with the RH group, when both the RH intervention and the GED preparation were completed this trend had diminished. It should also be noted that almost twice as much time was spent on enhancing reading skills in the LL group compared to the RH group. It is plausible that had both groups spent equal amounts of time on the content of the reading interventions any differences in improvement between groups would have been eliminated.

In addition, it is critical to note that the delivery of the RH program may have been an issue in the relative difference in progress in the measured areas of reading. In particular, the format was one of 4-hour days working exclusively with the material using computer delivery. This format may have been particularly taxing to a group of participants who had not been in an academic setting for at least one year and in many cases for a number of years. This may have influenced engagement and the degree to which the material was integrated into their repertoire of skills. The authors feel that a different delivery format, one that alternated RH work with classroom based GED work throughout the study day may have yielded more favorable results.

7.1   Limitations

There were a number of limitations to this study. The first was the missing data for a number of the participants at post-test time 2. Though there did not appear to be a systematic bias the reduced number influences the reliability of the statistical findings. Nonetheless, the data collected and the associated findings did provide valuable insight into the effectiveness of

the literacy interventions in the present context. Second, the research design for the RH intervention, required participants to spend extended periods at the computer without alternate activities available. This may have had a negative effect on the outcomes of those participants since these relatively long periods working on the computer may have been particularly taxing for those with little contact with academic material in the recent past. It is likely this resulted in poorer engagement with the material than would have been noted if more flexibility for the learner had been provided. Third, due to the sample size it was necessary, in order to answer the research questions, to run multiple MANOVA. This may have inflated the probability of type 1 error and as such the results of the *a postori* analyses must be interpreted with caution. Fourth, a "Hawthorne effect", whereby the nature of the study was sufficient motivation to improve performance, may have been present and in part, explain the improvements noted at each level of analysis for all groups.

7.2   Recommendations for Programming

A number of recommendations regarding program development are suggested based upon this study and related research. First, the benefits of phonologically based reading programs are well established in the research literature through rigorous studies using a plethora of designs across a variety of populations and settings. As such the use of such interventions with those experiencing the greatest amount of difficulty with literacy is supported. Though not clearly established in the present study the use of both classroom based and computer based interventions are viable dependant upon the learning environment and availability of classroom space, trained instructors and computers. As noted previously, a key issue in the use of computer based interventions would be the schedule utilized to deliver the program. As observed in other studies and reviews it may be most appropriate to provide short-intensive sessions each day over a relatively longer period of time as opposed to "full-days" working exclusively on the computer over a shorter number of days.

Numerous avenues for future research have emerged based upon the present study. The primary one being a study of similar design that targets those with the lowest levels of literacy who are enrolling in the GED preparatory class for referral to a literacy program. The

success of the LL program with such a population in a previous study (McKenna et al. 2004) would suggest that doing so may be more beneficial than recruiting all those who enroll in GED preparation. With a sample of this nature it may be more readily apparent if either reading intervention provides greater benefit and if this in turn translates into greater GED success. Though given the relatively small number of such potential participants enrolling in GED preparation programs it may be necessary to collect data over 2 or 3 academic years in order to attain a sufficient number to allow for appropriate data analysis. A specific study designed to explore the nature of the GED preparatory program and the reasons for its apparent positive impact on reading development would also be informative. As would a program that intermingled programming from either LL or RH or both with the GED preparation material so as to allow reading development to occur in conjunction with the curriculum rather than as a separate adjunct to the present curriculum. Finally, researching the link between instructor rating of student attitude and student performance on the reading measures may provide valuable information on student-teacher interaction.

8.   Conclusions

Research into the most effective means of providing reading remediation to low literacy adults is limited and yet essential to addressing the issue of low literacy skills within the adult population provincially and nationally. Despite this, research is sparse within this domain. The present study was designed to explore the influence of two structured reading programs, one classroom-based and one computer-delivered, on the time to complete and success at attaining the GED credential.

Results indicated that improvement in reading was attained regardless as to whether participants were enrolled in the reading interventions or in the regular GED program. Likewise, significant improvements in course specific skills (math, science, writing) were attained by all participants despite a lack of contact with course specific information by those in the reading interventions. This generalized improvement in skills across domains and without reference to the specific training received lends itself to various interpretations. In reference to those in the reading specific programs who improved significantly in course specific skill it is likely they performed better in the testing as a result of improved reading skills that led to the ability to read and comprehend the questions and answer options more effectively. Of course, the alternative interpretation is that improvements across domains may have been related to the Hawthorne Effect. Also, the "use or lose it" phenomena may have been present. Many participants had been outside of an educational setting for extended periods and lack of contact with formal schooling may have resulted in "slipping" of their basic skills. However, once enrolled in an educational program which would have included increased exposure to reading and implicit instruction of reading related skills an improvement in these skills occurred. The probability of this is enhanced when considering that many of the participants were reading adequately at time of enrollment in the program. It is interesting to note that improvements occurred across domains regardless of intervention. This can be viewed as an indication that 1) literacy training can be of value to those entering GED preparation and 2) GED preparation programs provide valuable educational experiences beyond the specific skill areas typically addressed in the classroom. It is very interesting to note that math and science showed the most significant improvement of all subjects. While part of this improvement may

have been related to improved abilities to read the problems and thus answer questions more effectively, it also may be indicative of the development of more critical thinking process, based on the structure of the reading interventions or the classroom approaches to these topics. Improvement in math and science is an important advance in educational levels for further postsecondary aspirations and therefore, more research on how this link may be improved even more with a literacy intervention is required.

These results in conjunction with related studies also lend themselves to the interpretation that literacy specific training leads to benefits across domains for those who participate. However, it may be more economical, both in terms of time and money, to target these intervention to those with the lowest literacy scores (e.g. elementary school levels of functioning or lower) in order to minimize time in training for those with already adequately developed skills and to maximize the benefits related to the improvement of reading skills for those functioning at the lowest levels.

A potentially significant finding was the correlation between instructor rating of student attitude and performance on reading measures. It was noted that those who received the lowest rating for attitude were also the students who did most poorly on the reading measures. This finding taken in conjunction with the noted improvement across measured domains regardless of group assignment may reflect the instructors' ability to be attuned to the needs of the student and respond to those needs in a meaningful way. Students' needs outside the educational sphere, for example poor attitude, are also recognized. Direct intervention at this level may be outside the instructors' immediate duties but it does allow access of other related supports as required, such as counseling. This is a significant finding given it is not a requirement for anyone wishing to take the Department of Education administered GED exam, to have attended a GED preparation class. However, students who choose to take a GED preparation course receive qualified instruction from teachers who are well trained in assessing student attitude and performance on reading measures. Further research related to instructors' perception of students would be valuable.

The results allow for better understanding of the influence of present programming practices on GED preparation and attainment. It also provides evidence for best practice

models in GED delivery, such as a targeted approach to literacy interventions for GED students. Moreover, it informs future research and practice regarding the need for literacy intervention and the benefits accrued by those who participate.

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Appendix A

Description of Study for Potential Participants

I am contacting you because you checked on your application form for GED preparation that you would be interested in participating in a research project. The project we are organizing focuses on helping GED prep students improve their reading skills. The idea is that most people who have been out of school for more than a couple of years can likely benefit from a review and re-learning of some basic reading skills. We expect that those who take some time during their GED prep program to improve their reading skills will have a better chance of being more successful when they write the GED exam.

If you were interested we would include your name in the list of those participating. Each person would be placed in one of three groups, 1) classroom reading program taught in small groups with others that are reading at the same level, 2) a self-directed computer based reading program that you can work on at your own pace or, 3) working only in the GED preparation course with no reading instruction. The reading programs only take a couple of weeks to complete, approximately 60 hours. Everyone who participates will have the chance to have their reading skill measured at three different times during the program to see if the programs are helpful. We think by doing this study that we at the college will be better able to know what is most helpful for future students when they are trying to get their GED. The only drawback that we can see to participating, is the extra time taken to focus on improving reading skills. But we think this is outweighed by the possible benefits of improved reading, which may lead to greater success when writing the GED exam.

It would be helpful if you were willing to give this a try. You can change your mind at any time and still be able to continue with the regular GED program. Can we include you in our program?

ADULT & COMMUNITY EDUCATION

140 Weymouth Street

Charlottetown, PEI

C1A 4Z1

Research Project Title: Reading Research Phase III – A comparative study of small-group classroom based literacy instruction and computer based literacy instruction on the success of adult learners in a GED preparation program.
Investigator(s): Brian McMillan, Audrey Penner and Greg McKenna

The purpose of this research study is to determine the effects of specific reading programs on adults who are preparing to write the GED. Participants are chosen for the study based upon enrollment in adult education programs at Holland College, and willingness to participate.

Three groups, two reading programs and a no-intervention group, are being used. Each participant will be randomly assigned to one of these three groups. One reading program is 60 hours long and is instructed in a small group format. The other reading program is self-directed through facilitated use of a computer program and varies in length. Both reading programs will be taught or facilitated by Institute of Adult and Community Education (IACE) staff. The no-intervention group will move directly into the standard GED program.

Reading and GED readiness assessments are given prior to beginning and at different points during and after the reading programs and GED program. Pre-testing on the reading measures will take approximately 30 minutes and two rounds of post-testing that will each take 30 minutes. GED readiness testing is also completed prior to the beginning of the program and at two points thereafter. This is done so that the progress of each student can be measured and as a means of evaluating the program. Staff from Holland College or the IACE will perform the assessments. Marks from the actual GED test will also be attained from the Department of

Education. Some background information will also be collected at the beginning of the program.

Participation in this study appears to carry no more risks than would be encountered in everyday life and/or in any other classroom based educational program. Most participants will likely notice an improvement in their reading skill.

Participation in this study is voluntary and you are free to withdraw from the study at any time by informing one of the staff of your intentions. Withdrawing from the study will not prejudice your participation in the regular GED program.

In order to ensure confidentiality, each participant will be assigned a research number. Analysis will take place using the participants= number. Only the research staff will have access to this data. All data will be securely stored and maintained for five (5) years after publication. Published information will be a description of group results and will **not** provide data on individual results.

My signature below indicates I have read, or have had read to me, this letter of information, and I understand the project as outlined.

Participant's Signature   **Date**

Investigator and/or Delegate's Signature   **Date**

Witness's Signature   **Date**

A copy of this consent form has been given to you to keep for your records and reference.

Consent Form

ADULT & COMMUNITY EDUCATION

140 Weymouth Street

Charlottetown, PEI

ClA 4Z1

Consent Form

Research Project Title:

Reading Research Phase III – A comparative study of small-group classroom based literacy instruction and computer based literacy instruction on the success of adult learners in a GED preparation program.

This study is being sponsored by the Canadian Council on Learning.

Investigator(s):

Brian McMillan, Audrey Penner and Greg McKenna

Purpose of the study:

The purpose of this study is to determine the effects of specific reading programs on adult learners preparing for GED.

Process:

Measures of reading, GED readiness, GED marks, and background will be taken before and after the reading and GED programs.

Risks:

Participation in this study appears to carry no more risks than would be encountered in everyday life and/or in any other educational program.

Confidentiality:

I understand that the information will be kept confidential within the limits of the law.

Release:

I authorize the researcher(s) or their designate to contact the Department of

Education for the purpose of attaining my marks on the GED examination.

Rights:

- I understand that my participation is voluntary.

- I know that I have the freedom to withdraw from the study at any time and that I do not have to answer any question.

- I understand that my non-participation in the study will not affect my standing in the GED program.

- I understand that I can keep a copy of the signed and dated consent form.

- I understand that at any time I can contact Brian Lambert, Quality Coordinator, at 1-800-446-5265 or 566-9594 if I have any concerns about the ethical conduct of this study. I also understand that these concerns will be communicated to the ethics review board that approved this study.

I have read, or have had read to me, the material in the information letter, and I agree to participate in the study.

Signature   Date

Witness   Date

Appendix B

Questionnaire

RRIII - Questionnaire

Name:_____DOB:_____Age:_____Gender: _____

Date:_____Cohort:_____

Education:

1- What was the last grade you completed in the public school system? Aca/Gen/Pra

2- Did you repeat any grades? Which one(s)?

3- What was your experience like in school?

1- very bad	4 - good
2- bad	5-very good
3- neither good nor bad	

4- Have you written the GED test?   Yes   No

5- Have you ever taken academic upgrading?   Yes   No

6- How would you rate your ability to get more education?

1- very poor ability	
2- poor ability	4 - good ability
3- average ability	5- very good ability

7- In the 12 months following this program how likely is it that you will go back to school?

1 - very unlikely   4 - likely

2 - unlikely   5 - very likely

3 - unsure

Employment:

8- Thinking about your last job.

What type of job was it?_____.

Was it year-round__, seasonal__, temporary__?

Full-time__or part-time__?

What were you paid?… $_____ /hour

The main reason you left this job?

9- How would you rate your ability to get a <u>better</u> job?

1 - very poor ability   4 - good ability

2 - poor ability   5 - very good ability

3 - average ability

10- How satisfied are you with the type of employment you have had?

1 - very unsatisfied   4 - satisfied

2 - unsatisfied   5-very satisfied

3 - neither satisfied nor unsatisfied

Subjective:

11- How would you rate your reading ability?

       1 - very poor   4 - good

       2 - poor   5 - very good

       3 - average

12- What is your current attitude toward reading?

       1 - very negative   4 - positive

       2 – negative   5 - very positive

       3 – neither neg. nor pos

13- Do you read at home?

       1 - never   4 - regularly

       2 - rarely   5 - a lot

       3 - some

14- Do you read for work?

       1 - never   4 - regularly

       2 - rarely   5 - a lot

       3 - some

15- Do you think you could <u>do better</u> at your job if you were able to read better?

1 - definitely not

2 - probably not

3 - maybe

4 - probably yes

5 - definitely yes

16- Do you think you could <u>get a better</u> job if you were able to read better?

1 - definitely not

2 - probably not

3 – maybe

4 - probably yes

5 - definitely yes