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**EXECUTIVE SUMMARY OF
The Use of Educational Software in
Adult Literacy Programs:
a comparison of Integrated Learning Systems
and Stand-alone Software**



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l'alphabétisation*

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The Use of Educational Software in
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and Stand-alone Software**

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Executive Summary for the Computers in Adult Literacy Programs Research Project

Introduction

Within the last decade microcomputers have become much more affordable and thus much more prevalent in educational settings. This trend which primarily began in elementary and secondary education has now spread to adult education. Particularly in the field of adult literacy many educators are promoting the use of computer technology in a variety of ways; some recommend using general business software applications such as word-processors for writing, while others recommend using more specific educational software.

In the realm of educational software, there are two main types: stand-alone and integrated learning systems. Stand-alone software is material written for use on an individual personal computer. It usually covers one specific course or topic, such as "Computational Skills," "Game Power for Phonics, Plus," and "Lucky 7 Spelling Games" (Askov and Clark, 1991). Integrated learning systems (ILSes) are large pre-packaged

turnkey computer systems that provide for instruction in several subject areas and include the production of reports on student progress. The instruction offered by these system is usually distributed to a class of students via computer terminals or though a network of microcomputers (Smith and Sclafani, 1989:36).

Several ILS vendors have now added adult literacy education material to their courseware, while others have designed ILSes specifically for use with adult students.

Statement of Problem

As early as 1989, when various ILSes began to be used in Manitoban literacy programs, education specialists at the Adult Literacy and Basic Skills Unit expressed concerns over the efficacy, instructional methodology and cost-effectiveness of these packages. Considering the costs of such systems, anywhere from \$10,000 to \$100,000 (Levin, 1994), and considering the fact that ILSes are designed to be comprehensive resources (Wellburn, 1993), it seems reasonable that administrators and instructors in adult literacy programs should have enough relevant information about how suitable ILSes are for adult literacy students before purchasing them.

Purpose and Parameters of the Study

This research project therefore broadly aimed to investigate some of the purported advantages of using ILSes in adult literacy programs in Manitoba. Specifically it

examined three systems currently being used in the province, namely TRO's PLATO, the Columbia Computer Corporation package, and the Pathfinder computer-managed instruction system. Although Pathfinder is not actually an ILS for convenience it was labelled as such in this study. At the outset of the project, it was decided to focus only on reading instruction. Based on the literature review, the following four variables were selected:

1. Achievement gains in reading,
2. Changes in student attitudes towards computers,
3. Changes in student self-esteem, and
4. The basic computer skills acquired by the students.

These four variables, were assessed through a battery of qualitative and quantitative pre- and post-test instruments. Then the results for students using an ILS in a literacy program were compared to the results for students in other literacy programs who were using only stand-alone software.

In addition to investigating these four formal variables, a teacher's questionnaire was developed and administered to examine the other presumed advantages and disadvantages of using computer-assisted instruction in adult literacy classrooms which are often cited in the literature. Overall, twelve advantageous claims and eight disadvantageous claims were examined. Below, the findings of this study are summarized and when applicable recommendations are made.

Presumed Advantages

Claim 1: It has been claimed that through instruction on an ILS students will make considerable reading achievement gains in a short period of time. Therefore, it has been argued that ILSes teach reading effectively and efficiently.

Findings: All the teachers interviewed thought that their software, both ILS and stand-alone, was effective. However, the findings of the extensive literature review into this area showed that the research concerning ILS effectiveness with regards to achievement gains in reading is far from conclusive. This study compared students using ILSes to students using stand-alone software, and assessed them on a qualitative miscue diagnostic and comprehension test.

It was found that though some reading gains were made by both groups, they were certainly not the dramatic gains which are cited in the marketing materials. At the end of the twenty weeks of instruction, the majority of the students still had problems with their semantic processing abilities; that is their ability to focus on meaning when reading. No difference in reading gains between the ILS and standalone groups was found.

However, there were also some difficulties with obtaining data about reading improvement. This was because even though the teachers had said that the students in this study were Stage 3 readers, their reading levels during the pre-testing appeared to be far higher than Stage 3. Therefore only six of the eighteen students had adequate miscue data to analyse.

Recommendation 1: More research into the effectiveness of using computers in adult literacy settings needs to be conducted.

Discussion: If future research aims to compare types of software, it is recommended that qualitative instruments be used instead of standardized tests as this type of diagnostic provides educators with much more detailed information about how the students are reading. It is also recommended that, based on Clark (1983), the research should compare the instructional methods, organization and content of the software, instead of only comparing standardized achievement gains.

Recommendation 2: It is recommended that the Adult Literacy and Basic Skills Unit investigate how programs are initially assessing their students.

Discussion: As mentioned above, out of the eighteen students included in this study, twelve were not considered to be Stage 3 readers, even though the instructors said that they were. It is not clear why this occurred. It may be that these students were considered Stage 3 learners, because they were weaker in other skills. Another possibility is that for some reason instructors are resisting assessing learners as Stage 4 or perhaps they are having difficulty with initial assessment.

It does seem that instructors may be having some difficulties assessing the reading levels of ESL students. There were several ESL students in this study. Although the teachers said that they had comprehension problems, it seemed to the examiner that these students' problems were due to inadequate vocabulary levels or to the fact that they were relying on rote learning strategies to answer the comprehension questions.

Recommendation 3: It is recommended that teachers investigate ways of helping students to focus on their semantic processing abilities.

Discussion: Although the students in this study, in general, improved their phonographemic and syntactic processing skills, most students were still having difficulties with their semantic processing. Therefore, it seems that students need more assistance focusing on meaning when they are reading. Teachers may want to consider this when selecting reading tasks and planning reading instruction.

Claim 2: It has been claimed that by receiving instruction on a computer students will have more positive attitudes in general toward computers and this should be beneficial.

Findings: All students in both groups started with positive attitudes toward computers. The students using stand-alone software had a significant positive change in their attitudes after twenty weeks of instruction, whereas the students using an ILS had a negative change in their attitudes

Claim 3: It has been argued that by using computers students feel empowered and they gain more self-esteem.

Findings: All of the teachers thought that the computers empowered the students and all of the students said that they liked using them. However, the students self-esteem did not necessarily improve during instruction and if it did improve it did not correlate to using a computer. There was no difference between the ILS and standalone groups on this variable.

Claim 4: There is the possibility that by using computers in adult basic literacy programs, along with their academic gains, students will also acquire valuable computer skills

Findings: The students using computers, regardless of the type of software, do acquire some basic keyboarding and computer skills. However, the students who made the greatest improvements in this area were those who had received direct instruction in computer skills.

Recommendation 4: **It is recommended that more basic computer skills classes be provided for this population.**

Discussion: This study found that although students acquire some keyboarding and very basic computer skills by using computers in their classes, students who received direct instruction learned more skills and were more likely to reach their computer goals. The majority of the students in this study said that they would be interested in learning basic word-processing skills. Considering that the focus of the government is now on employability and considering that many more employers are now asking for employees with some computer experience, then it seems judicious to investigate ways of providing training for these students.

Claim 5: It has been claimed that ILSes provide cost-effective basic skills instruction.

Findings: Obviously if it is difficult to establish that computers provide effective instruction, then it is also difficult to argue that they are cost-effective. At this time there is insufficient data to either refute or support this claim.

Recommendation 5: **Since it does not look likely that the cost-effectiveness of any particular software package is to be established in the near future, it is**

recommended that teachers carefully weigh the costs of these packages in relation to their actual advantages and their own program budgets.

Claim 6: It has been claimed that computers are beneficial for adult students as they allow them to work privately.

Findings: Both ILSes and stand-alone software do afford the students privacy if they should want it. However, it is not at all clear that this is something adult literacy students necessarily want. Teachers should consider grouping students in pairs or small groups around computers, as this may improve learning gains.

Claim 7: It has been argued that having computers gives programs a certain amount of prestige and that by having computers more students will enrol in the programs.

Findings: Both ILSes and stand-alone computers do attract more students to these adult literacy programs. All of the programs regardless of their set-up are well-regarded by their communities.

Claim 8: It has been claimed that by using computers the content of literacy instruction materials can be individualized.

Findings: Although teachers agreed that the content of the materials they used was very important, the majority of the ILSes do not have authoring capabilities. That is there is no way for the teachers to add material which would be specifically relevant to their students' interests or goals. Thus the degree to which the content can actually be individualized is limited to choosing from pre-written lists of objectives and tasks. In both the ILSes and the stand-alone software, there are ranges of levels and different subject areas and this is the primary way materials are individualized.

Recommendation 6: It is recommended that all software for reading instruction include an authoring package.

Discussion: Since learning to read is made easier when the materials incorporate the students' prior knowledge (Smith, 1994), an authoring function is essential. With such a function, teachers could add texts that directly reflected the "student's prior experiences, culture and aspirations" (Fingeret, 1991). With such texts students, having more prior knowledge, will be able to make more effective predictions, which will make reading easier for them.

Claim 9: It has been argued that by using computers students will have more control over their learning.

Findings: The students using the ILSes and the stand-alone systems have some control over the software, but according to the students they do not have enough control. Thus, while at times students can scroll backwards, exit when they want and choose the general area they want to work in, they cannot flip through the exercises to find ones they like, select the level of text that they wish to work on, override the timing function in some packages, nor move onto more difficult exercises when they feel they are ready. Overall, the students' control is limited.

Recommendation 7: It is recommended that software developers redesign their current packages or design future packages to give students more control over the software.

Discussion: The students in this study were rightfully frustrated when the computer controlled their learning. Giving students control is essential to ensuring that software is compatible with an adult, learner-centred approach to literacy instruction.

Claim 10: It has been argued that computers provide students with fast constant feedback.

Findings: In both the ILS and stand-alone programs, teachers and students found this aspect of computers very useful and valuable. This fast and constant feedback is the primary advantage of using computers in adult education settings. The effectiveness and appropriateness of this feedback were not investigated in this study.

Recommendation 8: More research needs to be conducted into the effectiveness of computer feedback Also it is recommended that software developers enhance the feedback of their packages by adding ways of working students through the problems that they answer incorrectly. They should also add a way for teachers to remove any exercises and questions that are either not appropriate or wrong.

Discussion: Although teachers and students alike state that they find the computer feedback useful, more research needs to be done to investigate how effective this feedback is and to examine ways of improving such feedback.

For example, one of the teachers in this study pointed out, that students would begin to understand their mistakes better if they were clearly shown the correct way of working through problems. Thus, instead of just giving feedback as to whether or not the answer was correct or incorrect, the software should be designed to show the students the process. Some packages do this to some extent, but it would be useful if all packages included this type of feedback.

In addition, teachers need a way of removing faulty or problematic questions. Students get frustrated when the computer marks a correct answer as wrong. For the students who realize that it is the computer that is wrong, then these flaws are merely

frustrating. For those students who think they are wrong, when they are actually right, then these design flaws are potentially more serious.

Claim 11: It has been claimed that by having computers, more flexible programming can be offered and that teachers can do more individual tutoring.

Findings: While the claim is that computers will allow more flexible scheduling and they will allow teachers more time for individual instruction, the findings here did not support this claim. Scheduling still depends on having teachers available. It was also found that having computers in the programs did not translate into more one-to-one, or small group tutorials for the students.

Claim 12: ILSes provide extensive records for each student containing information about such things as student progress and areas that need improvement. It is claimed that these records are useful for teachers and students alike.

Findings: This is one of the main ways that ILSes differ from stand-alone software. Teachers said that the reports provided by the ILSes helped them to see their students' progress and to keep track of what the students were working on. However, the ILS records did not necessarily help teachers to evaluate the students' reading abilities. Moreover, because it seems that ILSes are placing students at artificially low levels to begin with, the progress that teachers are seeing may be skewed or 'false' progress. Several students pointed out that they found the ILS material too easy.

Recommendation 9: It is recommended that future research investigate how the ILSes evaluate and place students at various levels, and examine whether or not this assessment level is appropriate.

Of these twelve presumed advantages, the findings of this study support only four: computer skills, privacy, prestige, and feedback. One other, the management of records may or may not be an advantage depending on the needs of the teachers. Also, the claim about cost-effectiveness cannot be supported nor refuted. The six others claims, dramatic achievement gains, improved attitudes, increased self-esteem, individual content, control, and flexibility, are not supported. Thus the advantages of using educational software in adult literacy classes are fewer than is sometimes claimed.

Moreover, for all but one of these advantages, ILSes were identical to stand-alone software. The only advantage that ILSes have that stand-alone software does not have, is the capability to manage student records and even this advantage is somewhat limited. Overall, neither type of software was shown to be particularly more advantageous.

Presumed Disadvantages

Claim 1: It is claimed that some adults may be afraid of using computers

Findings: This disadvantage was not supported by this study. These students were not particularly anxious about computers. If they were nervous in the beginning of instruction, they quickly and easily overcame this initial fear.

Claim 2: It has been argued that computer technology quickly becomes outdated and thus educators may have difficulties keeping up with these changes.

Findings: This disadvantage is also not supported. While many of the teachers mentioned that updates to their systems were now needed, this was not seen as a disadvantage or problem. Rather it was seen as a normal process of keeping programs current.

Claim 3: It has been claimed that students and teachers alike may have technical difficulties with computer hardware and software.

Findings: This claim also cannot be supported. While there are some bugs in the software, and a few technical difficulties, these were not considered to be major issues. The programs working with donated computer hardware have more problems with the technology and ways of acquiring new equipment may need to be explored.

Claim 4: The cost of both hardware and software may be prohibitively high for many programs

Findings: While the issue of cost-effectiveness cannot be resolved at this time, the issue of cost is still a concern for many programs. Unfortunately, for many programs the cost of computer technology is still beyond their reach. ILSes are much more expensive than stand-alone packages, ranging anywhere from \$8,000 to \$100,000, whereas stand-alone packages range from \$25 to \$300.

Recommendation 10: **It is recommended that either more funding be made available to adult literacy programs so that adequate computer hardware and software can be purchased, or that ways of getting more donated hardware for the programs be investigated.**

Claim 5: It has been pointed out that to use computer technology effectively in adult literacy setting teachers will need adequate training.

Findings: This disadvantage does seem to be still relevant. While all of the ILS vendors provide some training, there is a lack of training for teachers using standalone computers.

Recommendation 11: It is recommended that the Adult Literacy and Basic Skills Unit research, organize, and provide training to teachers who want to use stand-alone software in their classes.

Discussion: If teachers are to use stand-alone packages effectively then they will need training. Some research has been done into ways of effectively using word-processors in adult literacy programs and the training could be partially based on such information. More research is also needed into the issue of different adult student groupings at the computers and whether or not pair or group work at the computer is more effective than private individual work. Also, it is time that researchers start looking into the issue of using communication technology, such as the Internet, with students.

The training designed should provide teachers with information about how to select and evaluate appropriate software packages for adult students, and how to integrate such software effectively into their curriculums.

Claim 6: It has been argued that the instructional methodology of some software and ILSES in particular are incompatible with a learner-centred adult education approach.

Findings: Several issues were found to be relevant here. First, the concern over the lack of adult-oriented materials does not seem to be a real issue, as most teachers felt their computer materials were adult-oriented.

Second, is the issue of student goals. It seems that students, especially ones using ILSES, are not meeting their reading goals. It is not clear if this disadvantage can be attributed to the software, or if it is because the goals which are being set are too broad.

The third issue relates to methodology. All of the teachers here seemed to follow a learner-centred methodology and they all seemed to understand the process of reading as being meaning- or schema-based. Although there is not sufficient data available, it does seem that the instructional methodology of some educational software is not compatible with this accepted approach.

Recommendation 12: It is recommended that the Adult Literacy and Basic Skills Unit help teachers to work on improving their ability to set more specific goals with their students.

Recommendation 13: More research needs to be conducted into the methodological approaches of the software packages being marketed to adult literacy programs. It is recommended that the Adult Literacy and Basic Skills Unit provide training for teachers so they can evaluate whether or not software is compatible with their own instructional approach.

Discussion: The issue of instructional approach is crucial as "materials such as ILSes, which tend to have strongly embedded theoretical approaches, can and do impose a philosophy of their own" (Welburn, 1993:21). Thus there is the possibility that, instead of being integrated into the existing curriculum, ILSes will tend to dominate the curriculum.

For example, The Metro Toronto Movement for Literacy found that with relation to educational software, "computers not only influence curriculum, they can become curriculum" (Garber et.al., 1994:4). They go on to argue that, "the danger of introducing computers ... is that the focus will shift from a learner-centred instruction to a highly structured computer-driven curriculum" (Garber et.al., 1994:5). Until further research is conducted it is recommended that teachers read Welburn (1993) and Millar (1996) for more information on this issue.

Claim 7: As just noted, it has been argued the teachers may have difficulty integrating computer software into the program curriculum.

Findings: In this study, all of the teachers saw the computer software as a useful supplement or tool. This is a good way to view it, but it seems that it would be more effective if the software could be tied in more closely with the class / program curriculum. It seems that software such as word-processing may be easier to integrate into adult education classrooms, than software with prescriptive curriculums. As noted earlier, it would be helpful if teachers had training in this area.

Claim 8: It is claimed that the introduction of computers will change both teachers' and students' roles and that they may find it difficult to adjust to these changes.

Findings: The claim that the introduction of computers into the program will negatively affect teacher and student roles is not supported. While some role changes do occur, these do not appear to be problematic

Summary of Disadvantages

Out of the eight presumed disadvantages, four of them, student fear, technological change, technical problems and role changes, did not seem to be problems for these programs. Four others, cost, Training, inappropriate instruction and integration, are still problematic issues.

There were several differences found between the ILSes and the standalone software. First, is that the ILS vendors provide training, whereas there is limited training for teachers wanting to use stand-alone software. Thus, it was recommended that more training be provided. Second, the ILSes are much more expensive than the stand-alone software, and they do not seem to provide many

more advantages. The other two disadvantages, inappropriate instruction and difficulty integrating the software into the program's curriculum apply to both types of pre-written educational software packages. They do not seem to apply to the use of word-processing packages.

Final Comparison of ILSes and Stand-alone Software

The charts below briefly summarize the advantages and disadvantages of using computers in adult literacy programs that were validated by this study.

Valid Advantages of Using any Computer Software with Adult Students

- Students acquire basic computer skills.
- Computers give students privacy if they want it.
- Computers are prestigious for the programs and they attract more students.
- Computers provide fast feedback for each student.

Valid Disadvantages of Using any Educational Software with Adult Students

- The software packages may not be appropriate for adult students, in that they may be based on an instructional approach which is incompatible with both a learner-centred program and an understanding of reading as a meaning or schema based process.
- It may be difficult to integrate the software packages into the program's curriculum effectively. The easiest packages to integrate are more generic packages, such as word-processing packages, whereas packages with prescriptive curriculums are more problematic.

The Similarities and Differences between using and ILS and Stand-alone Software

- ILSes are not any more effective than stand-alone CAI software packages in terms of the reading gains made by students, the students' attitudes toward computers, students' self-esteem, or the computer skills learned by students.
- ILSes do provide student records so that students and teachers can see their progress.
- ILS vendors provide training in using their packages, whereas at this time there is no training available for teachers wishing to use stand-alone CAI or word-processing software packages.
- ILSes are much more expensive than stand-alone packages, ranging anywhere from \$8,000 to \$100,000, whereas stand-alone CAI packages range from \$25 to \$300.

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