TEACHER DEVELOPMENT IN COMPUTER BASED EDUCATION: HELPING OTHERS TO EXCEL

MAURO CATTONI

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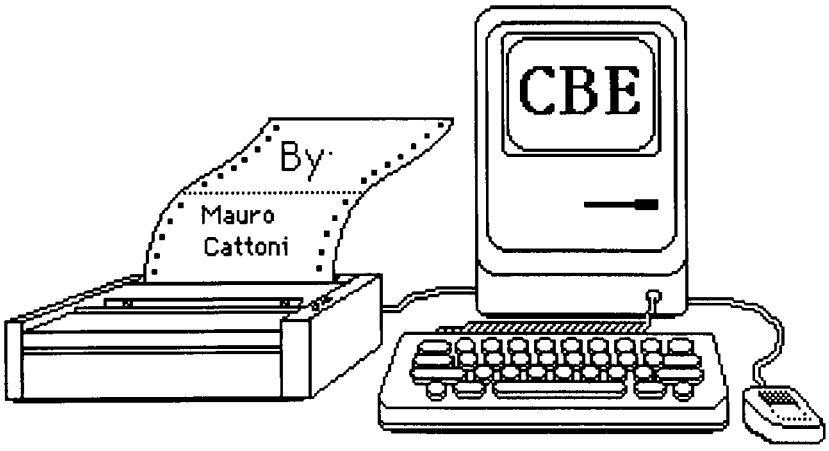
Helping others to Excel



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Introduction

A continuous wave of computer technology is available to teachers today. Computer use may range from Computer Assistant Instruction **(CAI)** to Computer Based Monitoring or Management **(CBM)**. Within the educational community there is widespread agreement on the potential of Computer Based Education **(CBE)** as an important instructional tool but, for many teachers and students, it is not yet realized. Advantages and disadvantages of the use of computers as instructional (CAI) or management (CBM) tools need to be fully explored by educational authorities so that Education can benefit from this new and exciting wave of technology. For this to happen, more and more teachers will have to experiment with computers and to find new ways of integrating the power of the computer into their effective traditional strategies. For example, the computer could play a much greater role in the special education classroom, to the benefit of both teachers and students. How might this be done? This paper will attempt to show that the use of appropriate software in a computer assisted instruction program assists students to reach Individual Education Program (IEP) goals.

The computer possesses the potential to be used as an effective instructional tool only in the hands of skillful teachers. It can be used not only as a "tutor" able to help students, but as a manager to assist with individualized instruction and to help manage the vast amount of record keeping that the Individualized Instruction Programs require.

Yet serious problems exist. Computers have taken the schools by

storm! There has been a great rush to computerize every classroom in part because of the parental concern that our children must be ready to meet the demands of the technological world. This rapid proliferation has been driven more by enthusiasm about the potential of the computer than by solid evidence about the computer's educational benefits (MacArthur, C., and Malouf, D., 1990). The 1980's turned into the age of the computer, the cure to most problems, especially in education (Kolich, M., 1985). But teachers, as a group, are lacking the knowledge to use the computer appropriately in the special education classroom.

Computer Based Instruction (CBI)

An almost surprisingly strong and consistent research finding is that children's motivation and positive social interactions increase as they cooperate in certain computer environments. (Nastasi, B., Clements, D., 1993; Hannafin, M. 1993; Hooper,S., and Hannafin, M., 1991; Swan, K., 1990). Group methods overcome many of the potential pitfalls of isolation while improving students academic achievement with computer based instruction. One frequently cited benefit of CBI is the potential for teachers to individualize by adjusting instruction according to demands of the learning task, processing requirements, and ongoing performance of the learner. However, the costs associated with providing uniquely adaptive lessons delivered by way of individual computer for each student are often prohibitive. The learning environments are inherently limited to those strategies, explanations, and resorts directly under computer control; students can neither receive the varied explanations of their peers nor gain cognitive benefits

associate with teaching among peers (Bargh & Schul, 1980). The learning environment that limited discovery was found to be a negative aspect of CBI because students who worked individually for extended periods of time often became lonely, bored, or frustrated, resulting in lower academic achievement, lower motivation, and a learning environment perceived as sterile and impersonal (Bargh & Schul, 1980; Harper, Hannafin 1991). Furthermore, as a result of this boredom and sterility it was discovered in a study performed by Higginbotham (1988) that students procrastinated and left the program early. This problem was alleviated by having the students work cooperatively using the group method that Harper & Hannafin (1991) advocate.

Cooperative learning also has important social benefits that improve self-esteem and attitudes toward peers in school work. The increase in academic and social performance is more effective when students are grouped heterogeneously, that is, group composition can be manipulated to include students with diverse experiences. The rationale for heterogeneous grouping is based on both affective and cognitive considerations. Students come across a wider diversity of social and academic experiences in heterogeneous rather than homogeneous groups. Thus, heterogeneous grouping is more likely to improve interpersonal interaction among group members. Heterogeneous grouping facilitates the dismantling of social barriers and misconceptions between majority and minority groups, the handicapped and non-handicapped, socially advantaged and disadvantaged, and males and females (Johnson and Johnson, 1989; Hooper and Hannifan,1991; Nastasi and Clements, 1993).

The above advocates of heterogeneous grouping claim that it benefits high and low-ability students. This is because less able, or

disadvantaged students receive more instructional support and regulation from their partners than from the classroom teacher. As well, they are more actively involved and, consequently, may observe their partners' learning strategies. In this peer teaching, the more able students, too, may benefit cognitively from explaining lesson ideas to their partners and from the opportunity to practice important skills.

Special Education

The passage of Public Law 94-142 (Education for All Handicapped Children) in the United States in 1975 had a great impact on Canadian Education of today (Blaschke, C., 1985). The number of children who suffer mild learning handicaps in the Special Education population are many. Enter the computer, the supreme motivator, the infinitely patient tutor and ultimate provider of individualized instruction for 93 percent of the children in the resource room who are considered to have mild learning handicaps (Neuman, Delia, 1989). Canadian Education, like that of the United States, requires the same process for instruction for the learning disabled child and for instructional management. The majority of school districts require an Individual Education Plan (IEP) for the Special Education Population in their schools.

Prevalence of Special Needs Children

The precise number of children with special handicapping condition has not been identified. This may be because definitions of special conditions vary widely across the country. In general, up to about 15.5% of children in the school age population will need special help in their school career. There are many different types of handicapping conditions: Mentally Handicapped, Learning Disabled, Behaviorally/Emotionally Disabled, Speech Impaired, Visually/Hearing Impaired, Physically Handicapped, and Multiple Handicapped. As well Gifted and Talented

students are often included in special education programs. Furthermore, a large percentage of students who do not fit into a particular category are consequently classified as "Other" (Winzer, M., et al 1987). This group classified as "Other" make up for nearly half of the handicapping conditions in special education.

Why Computer Based Education (CBE)?

Computer Based Education, including computer assisted instruction and computer based monitoring, has many characteristics that can enhance schooling for learning disabled children. Of course many of those same characteristics can help non-disabled children, but the learning disabled may need educationally sound techniques even more than the non learning disabled children if they are going to experience success.

As of 1988, over half of the special education teachers to whom computer equipment is available had taken a university course in computer assisted learning (CAL), and 2 out of 3 had participated in some kind of workshop on the topic (Sandals & Hughes,1988). However, only 11% reported they had completed course work in CAI directed toward special needs populations. It would appear that teachers are generally well informed about basic information relating to CAI but, in the area of special needs, it would appear that school systems should be increasing teachers' opportunities to participate in additional training and learning.

CBE can provide a secure one-on-one learning environment. This is very important with learning disabled children who may feel very unsure about themselves. The computer can act as a private tutor, helping learning disabled children overcome their shortcoming in communication skills. Because they are being tutored by a machine, these students do not have the added worry of developing rapport with a significant other. The threat of making mistakes is alleviated. The fear of having someone laugh at them can be allayed. The

consequences for getting the wrong answer are different, also. In the classroom the consequences for not deriving the correct answer may be expressions of concern from the teacher, or less than positive regard from others in the class, and possible parental concern. The consequences from the computer are an invitation to "try again", or individual review.

Encouraging the student to discover the right or wrong answer in privacy, with *less* negative feedback, allows the child to experiment by trying a few new things without the fear of being ridiculed. Furthermore, a secure environment also encourages students to develop independence and responsibility for their own work. CBE programs have the capability to enable this to happen. As well, they help the student develop accurate concepts effectively. A secure environment also encourages students to take responsibilities for their own learning experience. CBE provides freedom, and limits, without negative consequences. CBE can provide truly individual instruction. CBE can build skills and adequacy appropriate to the students' knowledge and skill levels and, through the use of "branching," the program can offer brief "help" sequences to enable students to continue and give examples and practice if warranted. The overarching objective is to build confidence through success, allowing children to see themselves as a learners.

Emotionally / Behaviorally Disturbed, (ED; BD) Students

Another positive characteristic of CBE is the interaction and involvement required by the student. The student needs to be involved. If the student does not continue, the computer will not force learning to occur. This expectation, is especially appropriate, for children with behavior disorders (BD) because they are difficult to motivate and teach (Fink, C., 1990). Compare this to a typical classroom, where the speed of a lesson is controlled by the teacher who usually goes the speed of the average student and stops when a question from another student is being

addressed, resulting in the learning disabled student getting off task. This problem that occurs especially with ED students can be dramatically decreased with CBE. The interaction and involvement that is required by the student to address the computer, and the immediate feedback that is provided, increase on task behavior.

Most ED students have experienced failure in traditional school settings (Fink, C., 1990). These kids with special needs have serious academic and social deficits and, often because of their "learned" experiences do not like school-related tasks. CAI may help students with emotional or behavior disability academically, by increasing attention span on task and decreasing disruptive behavior (Fink, C., 1990).

Providing immediate feedback is a strong element of CBE for all of the exceptional students in the school. Feedback lets students know about the correctness of a response, keeping them on target toward the objective of the program. There is no exposure to the tyranny of learner worksheets for example, that they can often fail miserably.

Computer Assisted Instruction (CAI)

Computers should be considered irreplaceable because they can be successfully integrated into any learning situation by the addition of selected software to meet the needs of individual students. Research has shown that some of the best applications for learning are in computer assisted instruction (Kolich, E., 1985). Computers have been proven especially effective in Mathematics programs for the gifted, for example, because of the versatility of computer programs. They can be used for advanced problem solving, estimation, integers, geometry, etc. (Hersberger and Wheatley, 1989). The computer has the skill to facilitate learning equally well for students at the opposite ends of the special needs population. Furthermore, computers have the capacity to deliver motivating, carefully monitored,

individualized, and speed-oriented practice in concentrations far beyond those available by traditional methods used (Toregesen, J., 1986). This is a very positive feature of CAI. Much evidence exists that CAI may be more effective than traditional methods, and not merely because a "placebo" effect results from the novelty of the computer use. Motivation "sticks around" at a high level and, logically, learning occurs. Furthermore Seymour, et al (1987) discovered that the students' willingness to return to the computer based learning (CBL) tasks is also an important factor in attempting to understand the effectiveness of the computer. You do not see students return to on-task behavior intrinsically too often. This phenomenon (returning to task) was observed to be significantly higher when subjects initially performed an easy task than when they performed a difficult one. Furthermore, boys often returned more frequently to challenging task and girls returned more frequently to easier ones (Seymour, et al, 1987).

Usually five methods are used to implement the use of the computer in assisting with special education. For computer based learning, the five most common modalities are Drill and Practice (most common), Games, Tutorial, Simulations, and Problem Solving. However, there is no doubt that there will be different techniques in the future because of the rapid progress that has been made in the last decade. As educators, we know that as children pass through the school years they are required to retain many facts and details in various subject areas. For the learning disabled this is a major concern. The majority of teachers are required to have an IEP for every student in need of special consideration. Computer assisted learning facilitates the learning process, acts in supplementary ways for a variety of learning activities, and still can provide valuable assistance in the great number of management tasks that teachers must perform.

Drill and practice is the most common and widely used of the Computer Aided Instruction methods in schools because, statistically speaking, it proves to be very

effective for learning (Watkins and Cynthia, 1981). Drill and practice is designed to enforce and encourage previously-learned material. A computer asks for a response to a question or problem. If the question is answered incorrectly, the computer will ask it again until the correct answer is found. The subject material is reinforced or practiced to such an extent that over-learning occurs.

There are a variety of programs on the market offering different formats and strategies to encourage learning. Generally, the majority of the programs are in the area of mathematics. These programs offer positive feedback and, sometimes, positive informative feedback such as, "Good answer, you answered that quickly". In addition, they often award points.

Almost as popular as Drill and Practice are Educational Games. Under close scrutiny, these programs look very much like drill and practice concealed in a game format. These programs are used because game type programs generate the important variable of high interest and motivation. One good example is Plato's Software Basic Math Facts. This format has the user race a "hot-rod"; the faster the user responds correctly to the math fact, the faster the car will travel. The instructions are clear and concise. The second race is against the first time, which is another car (a competitor). The competitor will travel at least as fast as the user scored the first time. This format is very motivating for users as they try to beat their best score. This can be continuous as they can always choose to race against their best score. This educational game really is just an effective drill and practice for basic math facts.

Tutorial games assume the role of the teacher and present the material in a programmed progression. The student progresses from one stage to the next as learning takes place, indicated by correctly answered questions. There can be review or remedial segments if warranted.

Simulations attempt to depict the underlying characteristics of real phenomena and are most widely used in the content areas of science or biology

(e.g. volcanoes and weather patterns). However, the majority of Special Education students need most of their remedial attention in Language Arts or Math and, unfortunately there is not a lot of software for the learning disabled in this category.

Problem solving uses the computer to solve a variety of problems or puzzles. The programming language "**Logo**" may be an example of the use of the computer in special education for solving problems. It develops logical thinking and problem solving skills by manipulating the turtle cursor around the screen, creating geographical shapes and designs by typing various demands. It is very useful in developing students' thinking skills and problem solving where traditional methods fail (Kolich, 1985).

Use of computers in developing students' composition skills

Writing is often a troublesome experience for children with special needs, especially the learning disabled (LD) (Schwartz, S., and MacArthur 1990), yet the computer continues to prove itself as a useful tool for writers at all levels. For example, word processing dramatically increases students' productivity and improves their editing skills. Computers were found to make good students into a better writers, so researchers such as Stenzel et al, (1989) sought to discover if the computer would transform poor writers into good writers. The question is still being researched today.

The cognitive process for composing is one that requires good short-term memory cognitive functioning because composing places an enormous burden on short term memory (see, for example Ely,1989, and Schwartz and MacArthur, 1990). The written products of LD students show deficits in low level skills such as handwriting, spelling, grammar, and punctuation. In addition, there are deficits in more crucial areas of content generalization, organization of text, and quality of revision. Ely, (1989) goes on to say that the cognitive process for writers is outlined

into four key elements: planning, generating, transcribing and editing. Alternatively, Reed (1990) describes the process as having three main concerns: prewriting, writing, and rewriting. Prewriting involves generating, selecting, and organizing potential ideas. Writing, which would be considered the first draft, involves elaboration of selected organized ideas and the development of complete sentences and paragraphs. Rewriting, commonly known as revision, centers on making changes to meaning and mechanics of the existing sentences. In the words of teacher Marguerite Nelson Creskey: "for students with writing problems the word processor is like a ramp for the physically disabled". The ease with which students can make corrections after they have put their ideas down on the screen of the computer helps the writing task. Gayl Boswer (1990), too, encourages teachers to use the word processor. Boswer suggest that writing can become a three-step process in which attention is first paid to writing the ideas down; then content and, later, mechanics .

For students' to write effectively and efficiently the sensory brain needs to function free of interference and anxiety. The interference that many learning disable students exhibit is primarily due to inadequacies of the sensory brain. The sensory brain is the general workings of five sensory systems that include: vision, audition, touch, taste, and olfaction. The use of a computer that has speech capabilities is beneficial to address this concern.

As students move through the grades a requirement, especially in junior and senior high, is to "write" more tests and papers to demonstrate their understanding of subject matter. It is a truism that written language is the mediator for all other learning and serves as the common method for demonstrating a student's understanding. Unfortunately the learning disabled (LD) students are at a disadvantage

to communicate their knowledge through the medium of written expression.

Written expression skills are many, not solely handwriting or spelling. The majority of authors who address written expression note that writing is one of humanity's highest level achievements because it requires the integration of many skills. (Bradley-Johnson & Lesiak, 1989; Graham, S., Harris, K., MacArthur, C., Schwartz, S. 1991). To write effectively, a person must generate ideas to write about, select words that adequately express the thoughts and use acceptable grammar. In addition the writer has to transcribe the message through hand writing or keyboarding, using punctuation, capitalization and spelling rules (Lesiak Judi 1992; Schwartz, S., and MacArthur 1990.). At any of these stages errors can occur. Similarly, errors in the final written products of LD students could be due to either an absence of revision or poor revision skills. If poor revision skills are the difficulty, differences should result from LD students' inability to identify errors or to correct identified errors. The difficulties in locating and correcting errors may be manifestations of a general deficit in communication skills, but it is worthy to note that the power of the computer can help alleviate the psychomotor and/or the convergent memory limitation of LD students (Ely, L., 1989; Espin, C., & Sindelar, P., 1988; Hunter, W., et al 1988; Schwartz, S., and MacArthur 1990).

Deficiencies in the Writing Ability of Children with Special Needs

The cause of the deficiencies mentioned above that word processing may help alleviate may be attributed to the following: **1)** problems with low-level skills may interfere with the cognitive process of generating and organizing content,

drafting and revising, **2)** students make lack the knowledge of type and difference of effective writing, **3)** and LD students may lack effective writing strategies for managing the processes of planning, drafting, and revising (Schwartz and MacArthur, 1990).

Keyboarding

Some CBE programs require "type-in" responses, which can help deal with reversal tendencies, as well as encourage accuracy and precision (Neuman, 1989). In some instances the student can even learn how to spell some difficult passwords needed to begin the program and develop eye-hand coordination and, maybe, a little keyboarding skill. However, to use the word processing application to it fullest, keyboarding skills need to be learned. The teacher should be aware that introducing the computer in the writing process will change the nature of this activity considerably. The use of the word processor coupled with adequate regular type skills should allow the students to use their time more effectively and efficiently in the writing process.

Anecdotal records that "speak" about the value of word processing are abundant, but by no means unanimous (Schwartz, S., and MacArthur, C., 1990; Dunn and Reay 1989). Some studies indicate word processors delay the development of writing, even with keyboarding skills. Yet others report increased amounts of writing especially with learning disabled (LD) students (see for example Hunter, W., et al 1988). There is controversy and mystique surrounding computers. Many teachers, particularly elementary teachers, often have the idea that their use of computers requires extensive knowledge. In reality, well written word processing programs require minimal prerequisite knowledge. According to Hunter (1988), four different activities are involved with the writing task; generalization, organizing, composing and revising. Each activity is an important part of the writing process.

The four different activities are interchangeable. The writer is continually faced with decisions about which part of the writing activity to engage in next. Presently, when students use the computer for composition tasks keyboarding is the primary way the students communicate with the computer. Consequently, says Hunter, inadequate typing skills may be interpreted as a lack of communication skills. Many teachers consider that poor keyboarding skills impede the writing process "Whole Language" teachers, for example, and advocates of those beliefs, believe, and rightly so, that writing is a high level cognitive function and the students' expressions are influenced by the frustration and anxiety caused by poor keyboarding skills.

Keyboarding is a hot issue. The arguments are intense. There are those who believe that if we allow students to learn keyboarding without proper instruction, or "incidentally", the inefficient habits the students develop become fixed. Others insist that mandatory keyboarding instruction as a prerequisite for writing with the computer will only encourage in students a poor attitude towards the computer (Dunn and Reay 1989).

Many of the authors quoted in this paper maintain that the task of revising compositions is simplified by using the word processor, and consequently, students write more. Positive guidance and leadership from the teacher can support steady improvements in students' writing. When teachers point out mistakes and discuss them with students, the quality of writing improves, as does students willingness to edit their own work (Cooper, 1989). In addition, computers may be used to provide "conversational" support for writing (Hunter, et al 1988). This "conversation" about their writing helps students generate information and ideas.

When students write in long hand, the process is both time consuming and cumbersome. Furthermore, many students feel self-conscious because of their penmanship. Using the word processor helps to alleviate the children's fear that

their compositions may be unreadable, and the students are more apt to ask for feedback as they work on their papers (Wright, 1988).

Students using words processors are more willing to share their work because of the quality of their hard copy. This is very true in Special Education, as a majority of the children involved with special education have some kind of disability, such as "**dysgraphia**" and other related problems that impede motor skills. While poor keyboarding skills will hinder the writing process more students would rather struggle, searching and scanning the keyboard for letters, than use their penmanship (Hunter, W. , et al 1988). This is notably a motivation factor. When children hunt and peck, they may fail to acquire the skillful techniques needed for the most efficient keystrokes. These techniques include sitting up straight, keeping the fingers on home keys, and keeping the thumb lightly pressing on the space bar. Is this a matter of concern, however? Speed and accuracy only need to be at least as fast as doing it by pen or pencil (Kahn and Freyd, 1990) The issue of "**bad habit**" when the young (or old) "hunt and peck" is a transition somewhat like printing preceding cursive writing. Teachers do not view printing as "**bad habit**", but rather a transitional skill that enables the children to express themselves easily in writing. In a few years, we expect them to stop using print and to use cursive writing, which requires a considerable amount of instructional time. In contrast, only about **twelve hours** of formal keyboarding instruction is required to undo bad habits (Kahn and Freyd 1990). Furthermore, spelling was observed to have improved because using the keyboard to type in a word made the student think more carefully about the spelling (Chan, C. 1989).

Since the use of the computer simplifies revision, teachers are asking for more revision with the use of the word processor. The students complain less often because they know that revising their work is practically effortless in contrast to "long hand" revising: adding, deleting, moving and correcting text. Coupled with the

teacher pointing out the students' mistakes and discussing them, as well as the students' greater willingness to correct errors, the use of the word processor simplifies the writing process, so that writing really does improve and learning takes place (Cane, 1989). The computer simplifies revisions which in turn allows for better results. In long hand, students often think that rewriting for neatness is an appropriate revision of a piece of writing. With the word processor, revising is so effortless that students do not object to revising their work. Students are all too eager to hand in their work when it is to be completed as a hand written assignment. However, when it is done on the word processor students are more likely to accept that they can and will edit and revise!

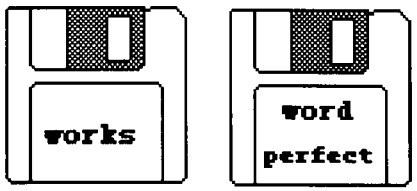
Most special-needs students can learn the location of keys and find using the keyboard easier than writing with pen and paper because of their handicapping condition. Therefore, they will probably practice writing longer, produce more detailed pieces, revise them more, and edit them more thoroughly than they do with paper and pen (Kahn and Freyd 1990). A few minutes a day with a photo-copy of a keyboard or a reasonable facsimile will serve sufficiently for children to gain minimal keyboarding skill, if computers are not available. It is in the writer's opinion that every time students have access to the computer, whether playing an educational game or a drill and practice program, they will further develop the fundamental knowledge of basic keyboarding skills that will encourage efficient use of their time. Having at least some knowledge of where the letter keys are will be a great start to using the computer as an instructional tool.

When special-needs children learn the location of keys, and find using the keyboard easier than writing with paper and pencil, they will practice writing differently, practice more often, write longer and more detailed pieces, edit them more thoroughly, and revise them in ways that they never dreamed they could with paper and pencil (Kahn and Freyd 1990). Hopefully, by the time these students

mature to upper grades, they will be better prepared to use the computer and word processing software to its fullest advantage.

Keyboarding offers great potential and teachers will fully realize this potential as they become more able to use it effectively with special education students. Moreover, teacher experience is necessary to help embed the use of the computer in the resource room instruction process. Teachers must integrate the use of the computer with curricular goals and objectives.

More and more composing software tools are being designed for student writers so it becomes more important for teachers to determine which, if any, would be suitable for the class. Furthermore, teachers must also realize that learners with the same handicapping condition may not respond in the same manner to the same software program (Smith, R., Vokurka, J. 1990). The needs of writers, based on their strengths and weaknesses, must be evaluated. For example, many of the better word processors include a spelling checker as part of the software package. A simple spell checker compares words to those in the programs dictionary. The program informs the writer if the word is in not in its dictionary. This type of spell checker is similar to **Works** dictionary. However, spelling checkers are not perfect editing tools because they miss misspellings of a word used inappropriately in the context of the sentence. For example a real word substitution (bat for boat) or grammar error limitations may be missed. Some compensating strategies may include dictionary skills, or using a peer editor to help detect errors the computer misses. All these and many other factors should be considered when deciding the best software package for students.



Motivation

There are many features of the computer that can help bridge the gap between reading and writing. The word processor can be used successfully in **(a)** Language Experience approaches **(b)** programs that enable writers to combine text and graphics, and **(c)** programs that facilitate interactive reading and writing experiences.

It is time then for more teachers to encourage their students in computer use to evaluate and explore what the computer can do, by using the computer themselves. For teachers the computer can be used in making classroom bulletin boards materials, maintaining records, writing tests, revising tests, and storing grades and student facts. For the special education teacher it can be used as an aid in writing Individual Education Programs (IEP) and to keep track of the volumes of personal and educational data. For the teacher who uses a language experience approach, word processors are invaluable for recording students' stories. Some of the advantages over traditional approaches are: **1)** language experience stories can be efficiently recorded and printed. Typing sentences into the computer takes less time than writing by hand (Anderson-Inman, Lynne, 1990), and **2)** Stories can be easily revised. Inserting new words and altering sentences of the text to make it more comprehensible and let the writer communicate more efficiently an important message to the reader.

Graphics

The readers surely must remember trying to "convert their writing to life" with hand-drawn pictures employing the waxed crayons that were supplied by the school. The computer brings an electronic touch to this process and adds a touch of professionalism to the final product at all levels. Software that supports the

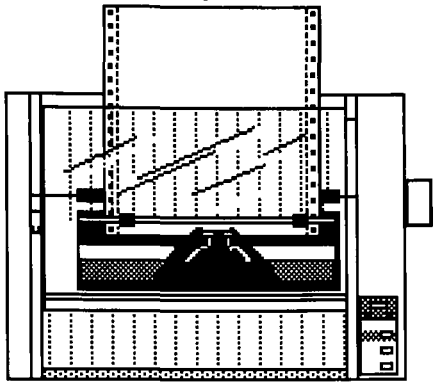
production of illustrated, student-generated materials is generally classified in three categories: (a) build-a-book programs, (b) electronic books, and (c) desktop publishing programs (Anderson-Inman, Lynne, 1990). An example of an desktop publishing is included below.

See the bunny run. Go bunny go.

Build-a-book software is abundantly available. This software tells student writers through a series of questions generally about themselves, their families and friends, how to personalize a story already on a disk. With a "draw on" capability, and copy and paste graphics, it is a valuable tool for any young story writer to use. The stories found on build-a book software programs are highly motivational and can really encourage young and reluctant writers to produce personalized materials (Anderson-Inman, Lynne, 1990).

Electronic Book software allows students to combine text and graphics to create what are called electronic grade books. The computer screen becomes the page. The writer is provided with an electronic tool for writing and illustrating stories, reports, bibliographies, and other text materials. Most of the available programs foster story writing, some with recognizable characters from cartoons and television such as Kermit's Electronic Story maker (Simon & Schuster), and Create with Garfield (DLM). Others offer more open ended set of graphics, such as Story Maker (Scholastic), Cotton Tales (MindPlay), and Bank Street Storybook (Mindscape), which can be drawn with the use of the computer. Dalton (1989) suggests that a

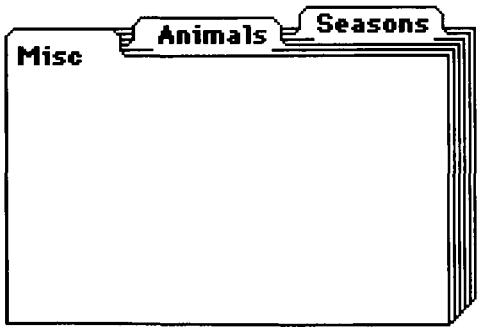
printer should be used in conjunction with this software to provide immediate feed back of the writing with a hard copy.



By providing an environment in which the learner moves back and forth between role of reader and role of writer (or even both roles simultaneously), the computer promotes a recognition that reading and writing are interrelated events. In addition, the skills the computer fosters in helping students apply text can give their stories a desk top publishing finish (Anderson-Inman, L., 1990).

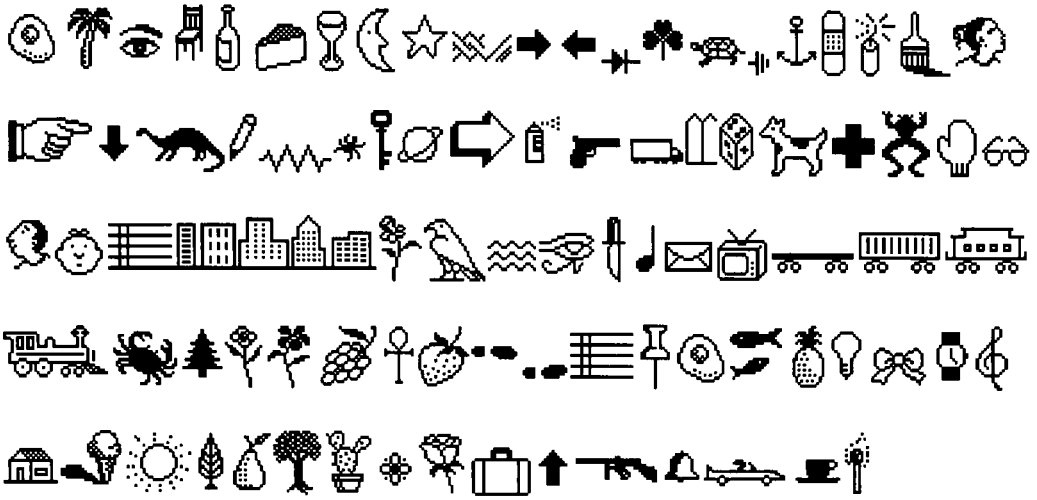
Two very popular desk top publishing programs are Newsroom (Springboard), and the more recent, The Children's Writing & Publishing Center (The Learning Company). These programs are easy to use and can be used by students as young as second grade to produce professional looking reports and stories. There is a large database of graphics to choose from, as well.

Data Base of Folders



This is a small sample to the number of graphics available with the Writing Center.

GRAPHIC BANK **Misc.**



The writing center and News room programs will wrap words around pictures placed in the text. At the higher grades different hardware configurations should be used in relation to speed and capacity. Emerging as another form of storytelling is a medium which employs the use of the hypercard; great potential exists for using the hypertext medium for both reading and writing complex, multi-linked stories (Anderson-Inman, L., 1990).

The computer continues to prove itself as a needed tool for writers at all levels and by most measures, word processing dramatically increases students' productivity and improves their editing.

Poor Writers into Good Writers

The notion of turning poor writers into good writers has always been part of the search to discover what benefits came with the development "electronic writing" (Ely, 1989). Research has gone through various stages of confusion and explanation, but there is little doubt that computer technology has brought unexpected challenges to teachers and experimenters. There is a lot of speculation

and wondering about what the computer can do for Special needs students (Stenzel et al, 1989).

Early publications by Fuchs et al,(1989) Cooper et al, (1990) and Chan,(1989) claimed that students experience improved attitude towards writing and moreover, the increased positive attitude in writing was prevalent because of the manner which the computer facilitates editing and revising. Many of the newer, more sophisticated word processors can be easily utilized by young writers. Writing, editing, spell checking, and saving of text can be carried out with easily-implemented procedures.

Computer Based Management

Computer Based Assessment

Computer Based Assessment has been widely promoted for its potential in assisting teachers in evaluating instructional needs, by regularly measuring students' performance within the school curriculum. With curriculum based assessment, academic goals are specified in the IEP. Ongoing assessment is then conducted to monitor the students' mastery of these goals. The assessment information is used to evaluate the instructional plan. When the teacher uses this information to evaluate the instructional plan and to make appropriate changes to the IEP, research indicates that teaching quality and students' performance are enhanced (Fuchs et al., 1989).

Curriculum Based Measurement

Despite the overwhelming data on the positive effect of curriculum based assessment, teachers are reluctant to carry out this procedure in the Special Education classroom. Although most special education teachers believe in its effectiveness, they are reluctant to use it because they say it is too time consuming. It was discovered that teachers spend over two minutes to prepare for measurement,

provide direction, administer the test, score the test, and graph the performance for one student in one academic area. Multiply this figure by the case load of special education students in a typical classroom, and it can be seen that teachers have to devote a considerable amount of time to such monitoring activities (Fuchs et al., 1989). To alleviate the time constraint issue, a piece of software has been developed. This very promising computer application is called Curriculum Based Monitoring. This piece of software automatically **(a)** generates probes, **(b)** administers and scores tests, **(c)** stores students' responses and scores, **(d)** graphs students' performances, **(e)** analyzes progress patterns, **(f)** provides decisions concerning the need to modify, and **(g)** makes instructional recommendations based on error analysis of student responses. This program facilitates the process of grading and recording the results, reducing the time teachers devote to management in the special education classroom.

Though it can appear to be a "gift from God" for special education teachers because of what it is capable of doing, it is uncertain how effectively CBM will aid the educator. Fuchs (1988) found that teachers who systematically monitored without computers had students who achieved equally as well as those whose assessment information was derived by the computer. In fact, school psychologists' biggest concern with computerized assessment is accurate interpretation of the data (Fuchs et al., 1989). Fuchs and others went further with their probe to document and ascertain whether CBM is effective for the learning process. They set up two different forms of feedback groups. One group was to be given enhanced feedback, and the other unenhanced feedback. Teachers in the enhanced feedback group independently inspected the database, formulated their own decision rules, and received (a) corrective feedback from the computer concerning accuracy of their decision according to the goal set in the IEP and (b) instructive feedback from the computer, which provided the rationale for the logic in appropriate decisions. This

allowed the teachers in this group to comply with decisions better than the unenhanced feedback teachers. Studies indicated that teachers who used the enhanced feedback system not only produced superior results but were more accurate in complying with the decision rules that were entered in the database previously. Another pertinent point is that with the implementation of the enhanced feedback system students registered superior achievement compared to the students of teachers in the unenhanced group. Teachers who used the unenhanced feedback complied less well with the decision rule and did not enjoy the results that the enhanced group did.

However, it is important to realize that while time can be saved in generating tests, grading, scoring, graphing, and data analysis is simplified, it remains equally important to maintain teachers' meaningful involvement with their student performance; They need to examine the graphs carefully and/or review the logic of decision rules. It was found enhanced feedback was successful in affecting the teachers' ability to follow decision rules.

Advantages of the Computer

A study completed by MacArthur and Malouf, (1990) found increased motivation to do school work which was mentioned by 85% of the surveyed teachers. It was rated as the number one student benefit, regardless of which application the students used. Several reasons were noted in the study for the students' enthusiasm about computer work. First, the instant positive informative feedback from the computers made school work more enjoyable. Second, the computer was an infinitely-patient tutor, encouraging "make up" which allowed the student to gain success while minimizing failure. However, simply providing a word processor without modifying instructional methods will not improve handicapped students' writing. Accordingly, four principles for effective writing instruction were mentioned in

the MacAurthur and Malouf report. They were: **1)** Allow sufficient time for writing instruction and practice. **2)** Teach writing as a process. Skilled writers need time reflecting upon what they are going to write, so teachers should encourage this. **3)** Teach writing through interactive group experiences e.g., brainstorming to generate enthusiasm about writing. **4)** Avoid excessive use of corrective feedback. The teacher has to be sensitive to the negative attitudes that mildly handicapped students bring to writing, e.g. do not be overly-concerned about spelling, punctuation and grammar (Isaacson, and MacArthur, 1988). A study conducted by Morocoo, (1989) found that the LD students performed significantly lower in writing quality than the non-LD students when both used the computers, as might be expected, but LD growth rates were similar to those of non-LD students. This suggest that LD student derive similar benefit from the use of the computer.

There are social and emotional benefits associated with computer use. According to MacArthur, and Malouf, (1990), special-needs students can become so familiar employing the computer that they can be given the opportunity to "tutor" regular education students in computer use. The use of a "buddy system", noted in the above study, during operation of the computer also aided social development by encouraging turn taking and cooperative behavior in the computer classroom. Social interaction of this sort with peers and teacher is very beneficial.

Disadvantages

The price of a computer has decreased drastically since the initial introduction into the schools of this new and improved technology. Programs supporting peripheral devices have also become available. However, though the price of computers is better than before, many educators need further training to allow them to use the computer effectively. This can be a considerable financial liability, especially if a staff is generally computer illiterate. Programs for training of teachers

may cause some distress for those who come from the "Old School" who may be apprehensive and thus reluctant to learn. These educators see computers as a fad, a high level machine toy that the students will grow tired of once the novelty wears off, so they continue to focus their teaching on traditional methods. For example, the majority of Lethbridge School District #51 staff are near retirement, and many do not feel enthusiastic about the use of computers even as a manager for record keeping. It could cost the local School District a lot of money to provide teachers with the opportunity to become computer literate.

Teachers' computer illiteracy can spawn fear and, consequently, a lack of confidence that affects the teachers' motivation to learn (Fuchs, L., Fuchs, D., Hamlett, C. 1989). But teachers are not only concerned about one kind of learning. Faced with the *"wave of computer technology"*, teachers are frustrated that they learn how to use one computer, and the relative software, only to have another computer surface that is better and faster with more variations of software. Some teachers feel, "Why should I learn how to use this computer when the new and improved one will make this one obsolete?" Regardless, it appears that the computer is here to stay so, sooner or later, special training will be required to integrate the computer along with the traditional methods and materials so the computer will be used to its optimal capabilities.

Software can be another area of concern. Much of the software that is available is, in my opinion, inadequate. Defects with respect to software include: poor feedback; poor record keeping that does not allow teachers to monitor students work; and, in some cases programs that are too noisy and distracting (MacArthur and Malouf, 1990). Many teachers who are not familiar with computers may tend to implement software programs that are "garbage", having really no educational value In such cases traditional methods would be much more practical and effective in

meeting IEP objectives. Concerned about using a computer in the Special Education classroom, the teachers may believe that they can hand the program to the students and "off they go" but even really good programs will need to be introduced carefully. All too often a teacher will use a program inappropriately because of lack of knowledge about the program. In most cases teachers use a program through word of mouth and, because teachers have the freedom to employ a program in any way they choose, a good program can often be used as filler to occupy free time and not to help meet a specific IEP objective or educational goals. Not many programs can "stand-alone". Teachers have to be computer literate to help their students use programs effectively. Teacher need to be well versed in the use of the software to utilize this medium to its fullest. In 1983, over 50% of the software evaluated by EPIE **(Education Products information Exchange)** was rated as "not recommended". In 1990 the situation had not improved much as evident by the Neills' latest edition of their software guide with only 7% of the software as being rated excellent - 766 of 11,000 programs evaluated (Lockard, J., Abrams, P., Many, W 1987).

Michael Langthorne (1988) advocates two criteria for the successful integration of computers into the schools. First and most common is knowing what will the computer be expected to do, in other words knowing which hardware and programs will be required. Once programs are decided upon the challenge then is to buy the best machine to do those jobs. However, Langthorne shows vision in that he suggests taking it one step further-integrating the computers in to teachers work habits. Ease of use ("user friendly") should be the criterion for choosing the best hardware. From my research I would say that Macintosh has the best hardware configuration. Learning how to use software on the Macintosh takes hours, rather than weeks it could take on the IBM and its DOS (Disk Operating System) clones. Consequently, Microsoft develops Windows long after DOS and the IBM-compatibles

hardware architect had become established. Since it was designed to be used with DOS, Windows suffers form some of the limitations inherent in DOS. Windows; post modern windows is in effect, an elaborate Macintosh style system designed to run on DOS based computers. Consumer Reports (1993) found Mac and Windows proved to be easier to use and therefore out perform DOS computers. This may be a hard pill to swallow if IBM's are already available because the Macintosh is proportionately more expensive than IBM clones, but the Macintosh will not gather dust on the users' desk. IBM's DOS computers will serve a purpose in accounting Labs. but they are not recommended for the general school population, and especially not for special-need students because the need to be user friendly is important for both students and teachers.

It is also important to know how to choose the most appropriate word processing package for an intended audience, just as it is important to know how, if at all, a particular word processor will function with the hardware available in any school site. Similarly, proper hardware and software configuration cannot be overlooked; a program that is said to be wonderful on a Macintosh may not be viewed in the same way on an IBM, and vice versa. When choosing a word processor to use in recording written language, and especially language experience stories, it is important that the program be simple to use and able to project text that can be read by a group of students, or students that are sight, sight-impaired using a large monitor. Magic Slate (Sunburst) works nicely because of the program's ability to change the size of the text to 20 or 40 characters per line. This makes the text larger in relation to a print-out for a hard copy or on-screen display. The large font size makes is easier for a group students to read from one monitor or for the visually impaired student to read (Anderson-Inman, 1990). Word processor applications are available at various grade levels, generally starting at grade four.

Two very popular desk top publishing programs are Newsroom (Springboard), and the more recent, The Children's Writing & Publishing Center (The Learning Company). These programs are easy to use and can be used by students as young as second grade to produce professional looking reports and stories. There is a large database of graphics to choose from.

Aside from the Word processors mentioned above there are many word processor programs available, Bank Street Beginner's Filer is appropriate for the primary grades. Two powerful programs are available that house all three applications (database, word processor, spread sheet): Apple Works (grade four and up) for Apple II computers and Microsoft Works for the IBM and Macintosh for grade nine and up (Chesebrough, 1989). Used creatively, these programs enable the students to explore and evaluate information in new and exciting ways. There is an increased availability of word processors with synthesized speech which adds another dimension to the use of the computer in the Special Education classroom. A talking word processor with graphic capabilities can provide immediate auditory stimulation to what has been written, so students can read and reread their stories on their own. Word processing programs with speech synthesis include Talking Text (Scholastic), Kids Talk (First Byte) and First Writer (Houghton Mifflin). In the future they will add voice recognition (Anderson-Inman 1990).

Educational Soundness

Programmers not familiar with the educational process develop programs happily applying old models to a new medium - e.g. page turners. Software should be chosen with care. Software that is just like a workbook will be as effective as a workbook (Bright, 1990). Too often, much of the software needs do not even match the established curriculum goals, and are only being used as "fill in" as the format may appeal to the student with such things as outstanding screen displays and

sound. Consequently when the program instructions are not very clear for the student, the program should be considered unacceptable. This alone may require the teachers' attention especially in the event of verbose instruction for the student who experiences difficulties in reading. The fact that the student who experiences difficulties with the software requires extensive intervention from the teacher should be considered inappropriate to allow independent learning for the learning disabled students (Neuman, 1989).

Neuman suggests many other implications for teachers and designers in the development of software. Generally, too much extensive intervention is required by teachers in the LD classroom. CBE requires more intensive and extended time and energy than is generally assumed, so teachers and administrators should plan for this requirement. Not only does the computer not replace the teacher, but in fact more time may be needed for the computer to be employed properly especially with children with special needs! Designers should recognize that some level of teacher intervention is inevitable and, in some respects, desirable. All the foregoing, notwithstanding, however, good programs can foster the use of power that the computer offers for independent learning, with such things as simpler directions, on-screen suggestions for getting answers (perhaps on student initiative), and informative feedback on responses (Neuman, 1989).

Concerns

The study conducted by MacArthur, and Malouf, (1990), noted mainly positive impact. The only negative comment had to do with the kids "arcade mentality". This phenomenon should <u>not</u> be viewed in a negative light. In my opinion, students playing a game on the computer build a "positive feeling" towards the computer which may encourage them to use the computer for educational purposes as well.

Much of the available software is not geared for special education. It may be that the presentations are too fast, too difficult, not in correct sequence, or too "childish", making them boring (MacArthur, and Malouf, 1990). If the software is used inappropriately for some students, they may find it boring or too difficult to use independently and consequently, the teacher will be forced to spend a great deal of time supervising and disciplining these students. Moreover, managing the computers in the school or in the classroom may prove to be bothersome. Software to be used appropriately in the classroom may need further evaluation, which the teacher does not have the time or, the skill to do.

Recommendations

As schools and teachers become more acquainted with the computer, different recommendations are sure to arise. My recommendations stem from my vast research and from interviewing special education teachers and faculty in this city. At least for the foreseeable future, educators will have a variety of different computers, different levels of computer access, different uses, and different educational approaches. Most do not have a stable pattern of use of microcomputers.

It appears that the special education teachers have the primary role in the decision on how to introduce the computer into the special education classroom. In making the decision, the Special Education teachers are constrained in critical areas such as availability of software and hardware as well as their computer literacy level and the amount of support available. Within these constraints the majority of the teachers have great freedom and little guidance in deciding how to employ the computer to its greatest advantage.

Successful incorporation of the computer into special education is not a simple task; it is not a matter of learning the technology and plugging in the

computer. According to MacAurthur and Malouf (1990) teachers needs to acquire appropriate software and balance a variety of goals and objectives specifically for the student with special needs to help achieve critical goals. To use the most appropriate hardware will help achieve optimal use of the media. For example, compositions with a word-processing program can be accomplished on any personal computer, but you would want at least 128k so that the teacher can use the more sophisticated program available for writing and graphics (Dalton, 1989). Depending on individual needs, the teacher has a choice of a variety of hardware, such as a mouse, a speech synthesizer, or a modem. A mouse makes it easier to use drawing and graphic programs. A speech synthesizer can be used with some word-processing programs and reading programs. Some programs, namely Echo II, read aloud students' writing at the word and sentence levels. This auditory feedback during the writing process is advantageous to writers who have a severe language problem, and for writers that are visual impaired (Dalton, 1989).

It should be realized that when the computer is implemented properly and being used to its greatest advantage teachers and administrators should be alerted to the serious requirements of an effective computer-support writing environment and worthy CAI.

Coordination for use of Micro Computers

Other than increasing the total amount of hardware and software in the school(s), access can be vastly improved through coordination in the purchasing decision (MacArthur, and Malouf, 1990). This is a very important consideration that one should involve outside agencies and technical support. A university or college could be a major support to develop computer literacy and the use of the computer in the schools, especially for the teachers who are computer illiterate. As well a technical store to furnish software and hardware that will be used in the school

should be a major support. More importantly, it would simplify the task of educating a staff if in-service to teachers on how to use the computer could be offered when there were only one hardware and software configuration to be concerned about.

As mentioned above, teachers may lack the time, knowledge or experience to implement software to its greatest advantage in the classroom. This can be addressed in part by training sessions focused on software evaluation and exposure to a good variety of software packages. Once teachers have been helped to integrate courseware properly, and as new software surfaces (strong new software packages appear monthly), it is more likely that teachers' would use software appropriately. In my guess, this is especially true if the software package has proven to be very successful. In addition, the time saved sharing knowledge and ideas on how to use and implement the package would be invaluable. Regular efforts to expand teachers' knowledge about software relative to a common hardware medium will contribute dramatically to the integration of computers in the schools.

At the present time, little is known about teachers' attitudes towards computers or about effective ways of involving them in computer implementation (MacArthur, and Malouf, 1990). This may be true especially for the many teachers who do not have a special interest in computer technology. Carnine, (1989) reaffirms, that using technology to reduce time and effort required to implement comprehensive interventions could lead to more instructional interactions between learning disabled and special education teachers. In Carnines study, teachers who had support from a computer consultant used the computer to some extent (MacArthur, and Malouf, 1990). In schools cannot afford a computer expert various strategies would be

needed for providing expert and peer support in computer use.

This review has shown that Computer Based Education has many strengths and few weaknesses. The computer has the capacity to help raise special needs childrens' self-image and confidence to a level where "success breeds success". It can do so creating a positive influence so strong on these children that it improves their cognitive functioning, thus enabling them to achieve more. **Computer Assisted Instruction** allows students to work independently with appropriate software, freeing the teacher to work with other groups or individuals who may need personal attention. Allowing students to work on their own helps them feel independent and self-reliant. Seymour (1987) detected an overwhelming actuality that the computer had the most striking motivational effect encouraging students to become self-driven. This was corroborated also by MacArthur, and Malouf (1990). "The hope is that teachers who learn to use this technology with innovativeness in the classroom will keep our students interested in learning and encourage them to study further"(Stulburg, 1991). My belief is Educators need to empower these children to 'aim high to rise' and not to allow them to feel they are going to lose, because if they do, they're lost. If we can prevent this then we will be better able to achieve our purposes in Special Education.

In my desire to become a productive educator for my school district and to promote a positive self-concept for myself, accepting the consequence of my fall is the first obstacle I need to conquer. At first, the school district thought that to return to school and retrain in my condition (profound hearing loss) was the road to travel. I somewhat reluctantly agreed, I was not so sure, but now I know returning to school

was the best idea for me. I took advantage of the situation; at another chance in life.

I seriously questioned whether I could actually be an effective teacher again, after being diagnosed with a demyelinating disorder. I painfully struggled for nearly two years at the University of Lethbridge in hopes of retraining myself so that I could get back into teaching again, but I started to feel "washed up". The university showed concern and some further testing of my condition enables me to understand what is a reality for me. The effect of the lesion is even more worrisome and the reality is bleak. Some recent neuropsychological tests (IQ) with the results of my Magnetic Resonance Image (MRI) scan performed for me at Montreal Neurological Institute indicate that I have suffered a lesion on my right frontal parietal lobe. The prognosis is a profound affect on personality and memory. I know I suffer an adverse effect concerning my memory, although according to significant others (namely my colleagues that I taught with before my illness), my personality is the same, if not "healthier." However, Dr. Bryan Kolb, from the University of Lethbridge, feels the consequence of the lesion on my cognitive functioning could have a negative impact as much as two standards of deviation! I have to make the best of bad situation.

As a result of my handicapping condition I have to focus down another highway in education. That being the case, I will help the students by helping the teachers foremost. I propose to do this with the new medium and tool in education, the computer. I feel I can do a great job consulting with my peers. It is not the students that I need the support from for this endeavor, as they are hungry for new and exciting ways of doing things, but it is my colleagues that I am a little worried

about. Will they accept me and the changes that I encourage from traditional methods or will my loss of up to two stanines with my convergent memory make the teachers' say, "Who is that deaf and dumb consultant?". I believe that being hard of hearing especially in a hearing society and, furthermore, working at a high level of expertise, you have to perform to the expectations of your clients. I have accepted the "reality" of my position in life; I hope the entire teaching and education profession can also accept what might result if they delay making changes to improve upon our traditional methods of teaching. Our children as we speak are falling further behind with their education in a growing global economy. When will we learn that change is in order?

There are many pitfalls I have to deal with en route towards my dream of being the best damn consultant Lethbridge has seen! I feel the proper use of computer technology has its place in educating our children for tomorrow, and I am convinced that I can work to make that happen.

The Reality In Schools

What needs to be done to improve teaching strategies for today's teachers. In the 1980's there suddenly became a "*new* " technology available to the teachers to improve the quality of Education, but it was expensive. The price of the computer, however, has decreased drastically since initial conception including hardware relative to speed and capacity, programs and supporting peripheral devices. Consequently, there has been a rush to computerize every classroom because of the parental concern to make our children ready to meet the demands of the technological world. This rapid proliferation has been driven more by enthusiasm about the potential of the computer than by solid evidence

about the computers educational benefits (MacArthur, C., and Malouf, D., 1990). However, though the price of computers is lower than ever before, many educators need further training to allow them to use the computer effectively in the classroom.

New Focus

Accepting that I may not again teach, as I once did before, because of a debilitating neurological disease that has left me with a profound hearing loss, and ambulatory only with a wide-based gait, has encouraged me to choose another course to follow with my professional development. My understanding of this initial diagnosis of being hard-of-hearing and unable to exhibit my psychomotor prowess was difficult for me to accept, but with some professional help, empathy, prayer, and most of all powerful positive thinking I have the courage to challenge all the obstacles and accept the disability to make the best of a rotten situation and not to let this situation make the best of me. I have studied very hard and tried to be the best I could be. My feeling was "if I try my best, I will be happy with myself" and this line of thinking has helped me succeed.

The biggest obstacle I have to deal with is a feeling that threatens to deter me from reaching my dream. I have to accept myself not being able to teach the way I know I once did. Along with that there are the strong feelings I have toward being a teacher, the love I have for teaching students, and finally, the feeling of remorse. I had a wonderful experience teaching before my illness, which included student teaching. After my return to teaching under the rehabilitative employment program that the school benefit plan offers my teaching experience was

reminiscent of my earlier teaching days. I was full of enthusiasm and I demonstrated a sincere appreciation for my students that, I am sure, they noticed. In spite of my debilitating condition, I made an impact on these students. I went out and did some "student" teaching and was informed by many people that I had a gift for teaching. Often I ask myself, "Then why can I not teach"?

The Answer

The answer to the above question is simple. My love and enthusiasm for teaching were infectious. My students too, became enthusiastic and eager learners. But I have to be careful not to run my self down just as I did when I became sick the first time. I worry about getting sick again; my concern is warranted, so I have to find different ways to find satisfaction in my work. I hope I can satisfy my desire, show I care, and exhibit a professional attitude toward students the same enthusiasm as I did when I was teaching. I can do so, I think, by learning as much as I can about computers in education so that I can help teachers and, in turn, make a valuable contribution to education.

Meanwhile I still have the concern about how will my professional peers perceive me and accept my consulting initiative. This is particularly true when I only have approximately two years of teaching experience. The more accomplished teachers may view me as a young and inexperienced teacher; my handicap of being hard-of-hearing confounds the situation. I am up against a brick wall so-to-speak. Teachers might say in the corridors "is this guy for real?"

The above situation is made potentially more bleak because of the area in which I wish to develop my skills and in which I hope to consult-

effective uses of computers. There are varying degrees of computer literacy in the schools. Some teachers are strong while many are weak at using the computer as a valuable instructional tool. Then, to make the issue more complex, many teachers have strongly opposing views of which hardware and software configuration is best suited for the curriculum. Some teachers say the best computer in education is the IBM and yet research indicates that the Macintosh is the hard ware to use in education. This is where the problems arise. Research indicates that once you decide the programs that can handle the jobs best, it follows that the machine to do those jobs must be bought. However, I concur with Lanthorne in that it is important to take this one step further: integrating the computers with employees' work habits. Ease of use should be the criterion for choosing the best hardware.

Becoming An Effective Consultant

I need to master eight skills in becoming the best damn consultant Lethbridge school district #51 can have. The more competent I am able to perform these skills the better able I will be to reach my dream. The skills I need to develop are: Questioning, Listening, Measuring, Planning, Esteem building, Group leadership, Visioning, and Enthusing.

Questioning requires me to question in ways that cause the teachers to think, decide, and act out improved patterns of behavior. Devising questions that promote learning requires ingenuity. If the teacher repeatedly asks questions about similar situations or problems, eventually I should stop providing the answers. Instead, I should develop a series of questions to ask the teacher:

What do you think should be done?

What are things could you do? What are the alternatives?

What do you think is the best alternative?

Why do you think that alternative is best?

Listening is also a very crucial skill to make me a good consultant. I need to develop this skill so I am able to listen with understanding. Research on communication indicates that 48% of meaning is conveyed by non-verbal symbols and signals, 45% is by tone, and only 7% by words. This is a god send because it means that you listen with your eyes as well as your ears to get the full message (Morrison, H., James, 1987).

I believe that I can cope with getting the message across. However the ability to detect tone will be a problem. Looking for the several nonverbal signals will give me a good idea of the teacher's position. For example, a positive nonverbal signal will be eagerness or openness while at the negative end of the spectrum I have to be aware of tension and defensiveness being demonstrated. It is my response to the message that is crucial. I should not let my inexperience intimidate me or to be a vehicle for criticism. I can alleviate this by making my arguments assertively while being open to two-way exchanges, by being relaxed, and by asking for more comments from others. Involving the groups with whom I will work with promote group leadership. Consensus in decision-making best facilitates synergy (collaborative goal setting and team building) This process fosters a can't-fail attitude with the teachers.

I must strive to increase the self-esteem of the teachers and administration. Fostering self-esteem in others is an important foundation for higher level management skills.

Measuring needs to transform vague goals into measurable performance. This can be accomplished by strategic planning. It is my opinion based on research that emphasis should be on long-term goals. This form of visioning matters less than the ability to communicate that vision to the teachers and to do the communication forcefully and clearly. For the above to be realized, I will need to project a contagiously enthusiastic attitude in the hope that this enthusiasm will be infectious and the teachers will also be energized into learning the role of computer technology in the schools.

Solutions To Help Me Overcome My Obstacles

Strong leadership is needed to allow computers to be used appropriately in Education under the most favorable conditions. A knowledgeable computer consultant, sufficient hardware and software, and support from all levels are all part of the equation as well.

Promoting a collaborative culture will "offset" my lack of hearing as the teachers become self-driven and independent. The genesis of a collaborative culture is not a top-down initiative. I believe the following actions will contribute to the development of a collaborative culture. I will generate mutual affection, caring and concern to increase individuals' self-esteem. In doing so, I will demonstrate concern about individual problems when they choose to express them. I will guide them to resources in and out of the school district that can help them solve their problems. I hope to gain power by sharing responsibility and authority with my colleagues. Sharing responsibilities with teachers builds self-esteem. Collaborative goal setting concerning the use of the computer in the School will enable the

teachers to feel that they are actually the authority that created the goal and as a result, they will be better able to meet that goal. It is my opinion that a long term goal can be broken into short term achievable and measurable objectives so that teachers can sense progress is being made: "success breeds success". This feeling of success develops a cooperative learning culture and participation is enhanced toward using the computer as tool in education.

Putting it All Together, Finally

For computer technology to be most effective a number of methods will facilitate change. By instigating a collaborative effort by all staff and stake holders I hope to form a team building culture. I will encourage concrete goals and objectives focusing on actual uses of technology that will serve curricular or administrative goals and rarely address more general technology topics unless that is needed to alleviate anxiety. I will have staff members who use the technology act as support. In addition, I will offer in-service training and be sensitive to staff members' personal needs and schedules, perhaps offering credit, stipends, and/or release time. I will support every lesson with handouts that spare the trainees from having to take copious notes and that trainees can use to support lessons in their classrooms. I will trust their, professional development to staff members' attitudes and expertise and be readily available for small group discussions and person-to-person instruction. Finally, I will try to have the movement to use computer technology through out the school community as an ongoing activity, not only a single event.

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APPENDICES

Computers in Education:

By David Moursund modified by Mauro Cattoni

How is your School Doing?

The computer is a mind tool. It is an aid to problem solving and to learning as well as a powerful change agent in our society and in our schools. It has the power to lift the esteem of the most reluctant learner. Every school must decide how computers will effect curriculum content and pedagogy. This is a difficult task since computers can impact every part of the curriculum and technology is still changing very rapidly.

The Computer-in-Education Leadership Assessment Instrument below is a way to see how well your school is incorporating technology in the schools. The 10 questions reflect the major topics concerning computer technology.

Answer each question on a five-point scale,
with
(1) Strongly Disagree to (5) Strongly Agree

1. My school has a carefully designed long-range (strategic) plan for instructional use of the computers in the school. I personally have established a good support system is broadly representative of the constituencies that I serve.

(strongly disagree) 1 2 3 4 5 **(strongly agree)**

2. My school has a well-qualified computer coordinator who plays a strong leadership role in shaping instructional use of computers. We have made substantial and continuing commitment to widespread instructional use of computers. We support this commitment through a line item budget to cover instructional computing hardware, software, curriculum materials and personal.

(strongly disagree) 1 2 3 4 5 **(strongly agree)**

3. My school has done a careful study of appropriate roles computer-assisted-instruction (CAI) to supplement "conventional" instruction and to ways to enhance learning to help our students build basic skills. Our use of CAI is solidly supported by research on its effectiveness as an aid to improving the quality of Education our students are gaining.

(strongly disagree) 1 2 3 4 5 **(strongly agree)**

4. My school has done a careful study of the curriculum content and how it is affected by the use of the computer as an aid to academic and to vocational problem solving. When the computer is an effective aid to such problem solving, the curriculum is being modified appropriately to reflect this computer capability. In addition, we offer an appropriate range of computer programming and computer science.

(strongly disagree) 1 2 3 4 5 **(strongly agree)**

5. My school has done a careful study of the use of distance education technology (for example, use of teleconferencing, or use of videotapes) and computer assisted instruction for the delivery of entire courses both for students and for staff development.

(strongly disagree) 1 2 3 4 5 **(strongly agree)**

6. My school has given careful consideration to providing students access to information through computerized information retrieval systems and on-line data bases. We have plans for making effective use of the computer technology to help share library media resources

among in my district. We provide good access to computer-based career and college information systems.

(**strongly disagree**) 1 2 3 4 5 (**strongly agree**)

7. My school has implemented a plan that ensures that all students became proficient in use of computers to aid in solving academic problems through out the curriculum. This means that all students learn to make effective, routine use of computer graphics, databases, spreadsheets, word processors, and other aids to problem solving. We have given careful thought to the issue of students learning keyboard, and we are satisfied with the decision that we implemented.

(**strongly disagree**) 1 2 3 4 5 (**strongly agree**)

8. My school has placed considerable emphasis on use the computer-related technology to empower teachers. Teachers have good access to computers for personal use and help them to do better in working with students. A substantial amount of computer-related staff development is available; good incentives have been provided to encourage teachers to gain increased knowledge and skill in making effective use of computers.

(**strongly disagree**) 1 2 3 4 5 (**strongly agree**)

9. My school recognizes that computers can be especially helpful to special needs children and to children at risk. We have made a special commitment to providing appropriate computer hardware, software instructional materials and support personal for these children.

(**strongly disagree**) 1 2 3 4 5 (**strongly agree**)

10. My school recognizes that it can contribute to and/or help alleviate some equity in computer access and type of computer use. For example, we have been careful to avoid the trap of using drill and practice software mainly with students from lower socio-economic status (SES) homes while using more sophisticated problem-solving software with higher SES students. Our computer plans give careful consideration to the fat that many higher SES students have good access to computers in their homes.

(**strongly disagree**) 1 2 3 4 5 (**strongly agree**)

SCORE	**COMMENT**
35 or above	Very impressive!
27 to 34	Very good
15 to 26	Okay.
25 or below	I hope in the future you find the computer valuable as teaching tool.

Thoughts about the computer as a tool?

By Mauro Cattoni (M.Ed.)

The 10 questions reflect how you feel about using the computer as a tool in your school. Answer each question on a five-point scale, with (1) Strongly Disagree to (5) Strongly agree Upon completion add up your score and see what you think about using the computer as tool.

1. I believe in using word-processing with writing assignments.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

2. I believe that longer and better quality reports will result because using the computer.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

3. The computer, with a spelling checker encourages the student to write what they are trying to say.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

4. I will like using the computer for class assignments.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

5. Using the computer for composing will facilitate a cooperative learning culture.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

6. I think I should learn how to use the computer to its optimal potential
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

7. Teachers as a group, can benefit from having access to a computer consultant.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

8 I believe the teacher keyboarding skills be developed to the optimal potential.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

9 Students will edit their work more frequently than they normally would have.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

10. Students will write longer sentences than they normally do.
   (strongly disagree) 1 2 3 4 5 **(strongly agree)**

SCORE	**COMMENT**
40 or above	Very impressive!
30 to 39	Very good
15 to 30	Okay.
29 or below	I hope in the future you find the computer valuable as teaching tool.

What Did You Think About writing with the Computer?

By Mauro Cattoni (M.Ed.)

The 15 questions reflect how you feel about writing with the computer and the writing process we used.

Answer each question on a five-point scale, with (1) Strongly Disagree to (5) Strongly Agree Upon completion add up your score and see how these statements sense how you feel about writing with the computer

1. I really liked writing on the computer.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

2. I wrote longer sentences because of the computer.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

3. The computer helped me with build basic skills. The use of CAI spelling program encourage me to really learn to correctly spell the words.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

4. I really liked sharing my work with my fellow students (peers) in class
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

5. Sharing my work with my peers help me write better.
(strongly agree) 1 2 3 4 5 **(strongly disagree)**

6. I think I learned how on how to use the computer to its fullest advantage.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

7. I thought that placing graphics to my story(s) was worthwhile.
(strongly agree) 1 2 3 4 5 **(strongly disagree)**

8. I believe that learning how to place graphics to the story was very worthwhile and help make my future compositions look very good.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

9. I think that the computer should be use more in our classroom for writing.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

10. I think that the computer should be use more in our classroom for CAI.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

11. I have improved my keyboarding skills.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

12. Keyboarding skills helped me with the writing process.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

13. I edited my work more frequently than I normally would have.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

14. I wrote a more than I normally do.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

15. Most of all, the teacher helped me to use the computer whereas I may never have had the opportunity to use it the way we have.
(strongly disagree) 1 2 3 4 5 **(strongly agree)**

SCORE	**COMMENT**
45 or above	Very impressive!
34 to 44	Very good
26 to 33	Okay.
25 or below	I hope in the future you find the computer valuable for learning