The Effects of Incorporating a Word Processor Into a Year Three Writing Program

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Writing, an essential part of every young child's school life, is a complex affair involving cognitive, affective, and psychomotor elements. Most children learn to write, with varying degrees of success, and every school has children who can be classified as nonwriters. Some children are inhibited and frustrated by writing and are put off by the thought of the writing process. Can word processing assist the writing process with young children? In response to this question, this qualitative study examined the effects of incorporating a word processor into a particular writing program. Seven students from a Year Three class participated in this study and were selected on the basis of convenience sampling from a split Year Three/Four class. The students undertook writing activities using both the word processor, and the more traditional method of pencil and paper, over the course of a six-week period of investigation. The students were interviewed at the beginning and at the end of the investigation, using both conversational and standardised open-ended techniques, about their attitudes towards writing, attitudes towards the writing program currently employed in the classroom, and attitudes towards word processors. Ongoing observations, anecdotal notes, and tape recordings of conversations formed another gathering dimension.

To assess the effects of incorporating a word processor in the writing program and on attitudes towards writing, the participating students' writing samples were evaluated using a standardised marking criteria (Tompkins, 1994) and the First Steps Writing Developmental Continuum (1994). The outcome of this study was a set of seven individual case studies describing the effects on the Year Three students' writing when word processors were incorporated into their writing program. Themes such as the effect of being able to use pictures, the effect on keyboard skills, the effect on enjoyment and confidence, and the effect on completion rates also emerged from this study and these are discussed in this article.

Learning to write in the primary classroom is essential if young children are to become literate members of society. With literacy forming a vital component of any writing program and a vital prerequisite for later life, every child needs to be able to write, to feel confident enough to write, and to form positive attitudes towards writing at an early age. To assist in this writing process, a word processor "can become the centrepiece for an effective writing curriculum" (Simic, 1994, p. 3). With this in mind, it is vital to investigate what happens to writing when a word processor is incorporated into the writing program.

There has been substantial research into the area of writing and the area of the use of computers in the primary classroom, but there appears to be little research into the combination of writing and word processors. There have been studies in relation to word processors and revision (Balajthy, McKeveny & Lacitignola, 1986), computers and nonwriters (Aumack, 1985) and the process approach to writing (Solomon, 1985). However, there does not appear to have been much research in the affects of writing and computers in the junior primary area, more specifically, word processing and Year Three (about eight years old) students. There is a need to know what effect the incorporation of a word processor can have on a writing program for these students. For those students, in particular those who are reluctant writers, the results of investigations of this type may provide a rationale for the inclusion of word processors into the writing program so these students may be no longer be hampered by some of the frustration that often accompanies writing tasks undertaken with pen and paper.

Writing can be defined as a dynamic process "rather than a series of steps" (Shrofel, 1991, p. 160), combining thinking, feeling, and talking. "It involves finding a good idea, determining its focus, and then choosing the

precise words that will express the idea so that others can understand it" (Solomon, 1985, p. 39). It can be a process "of discovery as writers develop ideas and create texts" (Daiute, 1985a, p. xiii). Writing should be seen as "more than a skill, more than an instrument; it is increasingly perceived to be central to the school learning process" (Walshe, 1981, p. 7).

Writing in school is often a long and quite laborious task and one that is sometimes viewed as "a one-sided game always won by the teacher" (Jenkinson, 1988, p. 712) due to the teacher having the final say over a student's writing piece. Children are often "hampered in their writing by the difficulties of transferring thought to paper" (Kahn, 1987, p. 11) and disheartened by their returned work "bleeding from the margins with red-pencilled abbreviations" (Jenkinson, 1988, p. 712). Because of this, children potentially can just give up and accept failure. For these children other ways of involving them in the joys of writing and the fulfilment which it can bring, need to be found.

Writing in the primary classroom is important because it can be "a deeply personal act of shaping our perception of the world and our relationship to people and things in that world" (Walshe, 1981, p. 19). It is through writing that we can often "sort out our ideas and thoughts in our attempt to make meaning" (Writing K-7 Teachers Notes, 1992, p. 3) of our world.

We write to learn and we also write in an attempt to communicate with others. We write to clarify and to explore our thoughts and meanings (Writing K-7 Teachers Notes, 1992). It is also through these personal quests that children should be encouraged as "children's writing develops when they are engaged in authentic language tasks for a variety of purposes that are clear to them" (First Steps Writing Developmental Continuum, 1992, p. xv). In this respect, children are able to "gain access to the knowledge they have" (Kelly & O'Kelly, 1993, p. 6).

Writing and Computers

Computers "have been widely endorsed by educators as a means for improving students' writing" (Harris & Graham, 1992, p. 6). A computer, "employed as a word processor, is a valuable aid to children's learning" (McGregor, 1984, p. 80).

A word processor, if implemented into the curriculum should not be used merely in isolation to perform unrelated tasks, or used as a reward tool. Rather, it "must supplement writing instruction, not replace it" (Balajthy et al., 1986, p. 28). How to use it should not be taught in isolation, rather it

"must be integrated with an effective instructional program" (MacArthur, 1988, p. 541). However, children "must still learn how to write by hand, with pen and pencil" (Aumack, 1985, p. 48) to ensure that they become literate members of our society.

When children see the finished product of their written pieces produced with the assistance of a word processor, they "experience great satisfaction and enjoyment" (McGregor, 1984, p. 84). This perspective often changes students' views of handwriting from one "where correctness mattered more than content and neatness possibly stifled creative impulses" (O'Brien, 1992, p. 98), to one where the students can achieve success and where they no longer need to be concerned primarily with neatness. For both teachers and students the computer experience can often challenge teachers' prior learning as well as add new dimensions to both teacher and student roles.

Word processing often "remains the most commonly used computer writing application in English classrooms. It is the one which teachers feel most comfortable even though the majority would exploit only a fraction of the software's capabilities" (Snyder, 1994, p. 169). This application can help students begin to see their work in a flexible way, where their ideas and thoughts can easily be changed, rearranged, combined, revised, or edited. "Students can experiment with writing and easily correct errors, thus encouraging risk taking and problem solving" (Tompkins, 1994, p. 356).

This enables the students to exploit the computer's capabilities of being able to "move backwards and forwards in the text, to attend to different parts more spontaneously" (Snyder, 1994, p. 169). This process and ease of text manipulation "makes it a near ideal companion for the writer's finicky thought processes."

Students' writing development has the potential to be greatly assisted by the introduction of word processing and an effective teaching program. It should be used to show the students how writers compose. "By articulating their thinking processes out loud as they generate text, teachers can expose the choices writers make when solving problems of forming sentences, clarifying ideas, and finding words" (Snyder, 1994, p. 171).

Word processing can promote students' motivation to write, engage the children in editing, assist proof-reading, help printing techniques, help students produce longer texts, and assist reluctant writers to write. "Using word processing relieves students from the tedium of recopying their final copies by hand" (Tompkins, 1994, p. 363). Newman (1984) as cited by Seawel, Smaldino, Steele and Lewis (1994) pointed out that "with word processors comes a willingness by students to take risks in their writing. They know that what they write can easily be discarded, moved or changed. They begin to vary sentence structures, word choices and text organisation" (p. 45). The

word processor is a tool that makes it "easier to get things right" (Kahn, 1987, p. 12). Also, students can be proud of their neatly printed, professional looking, "crispness of the computer copy" (Green, 1984, p. 22), boosting "students' feelings of accomplishment" (Tompkins, 1994, p. 364) as students, in general, "seem to care a great deal about the appearance of their written work" (Kahn, 1987, p. 12).

A process approach to writing is divided into stages. "Writing is not a single act, but rather an on-going process consisting of several progressive stages" (Boone, 1991, p. vii). These stages usually involve, "pre-writing, composing a rough draft, revising, editing and publishing" (Seawel et al., 1994, p. 44). All of these stages can become quite time consuming and often frustrating for students who have to rewrite multiple copies of their stories until they get it right. This decreases interest and motivation leading to the children not wanting to, as Watt (1983) suggests, "make creative changes in their writing when they know they'll have to re-write the entire work in order to integrate those changes" (as cited by Seawel, Smaldino, Steele & Lewis, 1994, p. 45). This provides huge hurdles for students just to complete a "publishable" copy of their work. This is where the inclusion of word processors in the writing program can help.

Teachers who have used word processors in their writing programs have noticed students' increased motivation and improved attitudes towards writing (Seawel et al., 1994). The use of word processors assists in the improvement of the students' first drafts with the students wanting to change word/sentences to make their writing more comprehensible.

The word processor encourages the students to see their writing as temporary, as "fluid rather then static" (Balajthy et al., 1986, p. 28), with elements that can easily be changed, permitting students to "make revisions as they write" (Kahn, 1987, p. 56). This "flexible writing tool" "eases the physical burden of revising and editing by eliminating the need for tedious recopying" (MacArthur, 1988, p. 37). This "electronic text manipulation permits new ideas to be viewed on screen in a temporary form, providing a realistic image of what is being written without the finality of ink or pencil on paper" (Boone, 1991, p. vii). This enables the students to "go with the flow" while writing, not having to "do battle with an eraser" (Kahn, 1987, p. 12) and without having to be concerned about the "need to go through the drudgery of the recopying process" (Yau, 1991, p. 4). This recopying process often leads to the students developing a negative attitude towards writing. Some students see this rewriting as a painful experience and often as "punishment for not catching 'mistakes' the first time" (Balajthy et al., 1986, p. 28). This is also highlighted by Daiute (1983) as cited by Seawel et al. (1994): "the word processing programs can help children to write and revise

more freely, willingly and creatively then with traditional writing instruments" (p. 44).

Although earlier studies do not specifically focus on Year Three students, this previous research indicates that word processors seem to have been mostly beneficial for those students that have used them. The potential benefits for students include enhancing editing skills, improving creative ideas, enhancing the mechanics of writing, expressing feelings of confidence, and achievement towards writing and displaying risk taking while writing. These previous results highlighted the very real possibilities that students involved in this study could achieve with the assistance of a word processor incorporated into their writing program.

Purpose of the Study

The purpose of this study was to investigate the effect on Year Three students' writing when a word processor was incorporated into the writing program. This investigation focussed on the students' attitudes towards writing by traditional methods and their attitudes towards writing with a word processor.

Three research questions provided the focus for this investigation.

1. What attitudes do seven Year Three students possess in terms of writing and the writing program currently in place in their classroom?
2. What attitudes do seven Year Three students possess in relation to the use of word processors and writing?
3. How is students' writing development affected when word processors are used?

Methodology

This investigation focused on seven participants (five girls and two boys) all from Year Three from a split Year Three/Four class in Metropolitan Perth, Western Australia. The students were selected on the basis of convenience sampling (Patton, 1990), as there were only seven Year Three students in the class.

The participants were involved in the study every day over the course of a six-week period, during their writing time, from 9:00am - 9:45am. Normally, during this writing time, the students were required to write on blank pieces of paper. Often they were provided with a story or sentence starter, but at other times, they were required to construct all of the stories without a starter.

Seven individual case studies were constructed from data gathered during the study. Interviews and observations formed the main data gathering techniques. In addition, field notes, document analysis and evaluation of writing samples, provided additional data to assist in the construction of the individual case studies.

Each student was engaged in a series of unstructured interviews throughout the six week period of investigation in an attempt to "discover the contents of their minds, their belief, wishes, feelings, desires, fears, intentions" (Minichiello, Aroni, Timewell & Alexander, 1995, p. 22) with relation to writing, word processors, the writing program and computers.

Criteria Used To Assess Students' Writing

Writing is "multidimensional and not adequately measured simply by counting the number or quality of compositions a student has written" (Tompkins, 1990, p. 370). With this in mind, a suitable marking criteria was needed to assess the writing abilities of each of the students who participated in this investigation. An analytic scoring system, as outlined by Tompkins (1994), and adapted from Diederich (as cited in Tompkins, 1994, p. 392) is one such scale that can be implemented to assess the quality of primary student's written compositions. In this system, writing is divided into four categories: (a) ideas, (b) organisation, (c) style, and (d) mechanics (as outlined in Figure 1) with each element in the category being classified as strong, average, or weak. These criteria permit a direct comparison to be made regarding the writing produced by the students. This comparison is not only limited to writing produced by each of the students involved in the study, but can be used to compare the students individual works, when completed using the more traditional method of pencil and paper, with those compositions produced using the word processor.

Ideas	Organisation
Ideas are creative	An organisational pattern is used
Ideas are well developed	Ideas are presented in logical order
Audience and purpose are considered	Topic sentences are clear
Style	**Mechanics**
Good choice of words	Most words are spelled correctly
Use of figurative language	Punctuation and capitalisation are used correctly
Variety of sentence patterns	Standard language is used

Figure 1. Standardised marking criteria (Tompkins, 1994)

This set of standardised marking criteria was used to evaluate each completed piece of writing that each participant produced. Each of the participants also wrote responses to the two standardised open-ended interviews which were also evaluated, adding a third dimension to their writing evaluation.

Each of the students' completed written pieces was evaluated using the criteria, not only by the researcher, but also by a second qualified teacher. Cooper and Odell (1977) subdivided the categories of Ideas, Organisation, Style, and Mechanics, into further subcategories of Strong, Average, and Weak. These categories were used to assess each of the students written pieces. Using such a well described system of evaluation enhanced the validity of the results.

Tasks Set

Over the course of this six-week investigation, all of the students were required to complete two hand written pieces of work and two word processed pieces. The first hand written piece was a creative story about the student's journey to school. They were provided with the story starter of "On my way to school…" but they could choose if they wanted to use it or not. This story could be as creative as they wanted it to be. The aim was to look at how creative the students were within the broad outline given.

The second hand written piece of writing was a Christmas story. The students were provided with a story starter and they were required to complete their story from there. The story starter was: "It was very early in the morning when…".

The first word-processed story required the students to complete a story. Five separate story starters were compiled on the word processor prior to word processing lessons commencement. The students were required to read each of the story starters, select the one that they liked the most and then complete a story based on this beginning. (It was interesting to note that all of the story starters were used and that friends didn't necessarily choose the same starter). The second word-processed story required the students to complete a Christmas story. However, the students had free choice as to what they wrote about.

Word Processing Package

The word processing package that was used for this investigation was *Story Book Weaver Deluxe* (The Learning Company, 1994). This writing

package is geared towards students between the ages of 6 and 12. This soft-ware package provides the students with 1,600 story images and enhances the students' motivation with "20,000 scene, colour, and pattern combina-tions" (*Story Book Weaver Deluxe*, 1994), all of which can be used to trigger the students' imagination. This program provides assistance in the produc-tion of story starters and, with the right equipment, can read the students' sto-ries back to them. This feature was not used in this study.

Data Collection and Analysis

Data was collected through observation, interviews, tape recordings and writing samples. Data collection in this investigation was divided into three stages:

1. before the study commenced;
2. during the study; and
3. after the study concluded

Before the Study Commenced

The classroom teacher was interviewed about the background of the par-ticipants with particular attention being paid to the students' writing abilities and their attitudes towards writing. This standardised open-ended interview was used to compile information, not only about the students' abilities, but also on the teachers' attitudes.

Some previous writing samples completed by the participants immedi-ately preceding this study were collected and evaluated in terms of the stan-dardised marking criteria as outlined by Tompkins (1994) and described in Figure 1. The students' writing samples were then analysed using the First Steps Writing Developmental Continuum (1994) (by the researcher with as-sistance from the classroom teacher) to determine their stage of writing de-velopment.

The final step in this stage was to interview the students, posing opinion and feeling type questions in the form of a standardised open-ended inter-view where the students wrote down and then discussed their responses, in order for the researcher to gain some insight into the students' attitudes to-wards writing as well as towards computers and word processing.

During the Study

During the interaction with the students over the period of six weeks, it was essential that multiple data collection occurred to enhance the reliability and the validity of the concluding results. From this phase of the study, a series of conversational interviews took place, observations and field notes were compiled and each of the students' writing samples were evaluated using the standardised marking criteria as previously outlined.

Discussions with the teacher with regards to writing outcomes were also conducted. Notes were devised in accordance with these criteria to help to shape a picture of each student's writing over the course of this study in conjunction with the word processor.

Anecdotal notes of extra and relevant information were also made to gather more information about each student over the course of the six-week period. This extra documentation contributed to the richness of the final report.

After the Study Concluded

At the completion of the study, all of the collected students' writing samples were analysed again in terms of the First Steps Writing Developmental Continuum (1994) and also evaluated in terms of the standardised marking criteria as outlined by Tompkins (1994). The students were re-interviewed using the standardised open-ended interview technique, about their attitudes towards writing and towards word processors in a similar fashion to the initial interview. Results were compared to the initial interview.

Results

Case studies were constructed from all the above data, however space considerations preclude their full reporting here. Rather what is presented are overall summaries of results aimed directly at answering the research questions posed. Figure 2 presents a summary of the results for each of the seven students for the measures of First Steps, change in attitude and checklist information.

Stud	FIRST STEPS PHASE		ATTITUDE TOWARDS WRITING		CHECKLIST (Tompkins, 1994)	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
A	Convert. Writing Phase	Convert Writing Phase	Strong feelings of distaste towards writing	Wanted to do more writing lessons using the word processor	Hand Writing: Strong Weaknesses: (Punctuation & capitalisation) Word Processing: Strong Weaknesses: None	Hand Writing: Strong Weaknesses: Mechanics Word Processing: Strong Weaknesses: None
B	Convert Writing Phase	Convert Writing Phase	Felt that she was not good at writing as she could not write neatly	Enjoyed completing her stories using the word processor	Hand Writing: Average/Strong Weaknesses: Style, Mechanics (Variety of sentence patterns & Punctuation) Word Processing: Average/Strong Weaknesses: Organisation, Style, Mechanics (Organisational pattern, variety of sentence patterns, punctuation)	Hand Writing: Average/Strong Weaknesses: Ideas, Organisation, Mechanics (Development of ideas, organisational pattern, spelling and punctuation) Word Processing: Average/Strong Weaknesses: Style, Mechanics (Choice of words, figurative language, punctuation)
D	Convert Writing Phase	Convert Writing Phase	Didn't think that she was a good writer as she was not neat	Enjoyed the writing task and using the word processor	Hand Writing: Weak/Average Weaknesses: Ideas, Organisation, Style, Mechanics (Creative ideas, development of ideas, choice of words, figurative language, sentence patterns, punctuation) Word Processing: Average Weaknesses: Organisation, Mechanics (Presentation of ideas, correct spelling of words, punctuation and capitalisation)	Hand Writing: Average Weaknesses: Ideas, Style, Mechanics (Development of ideas, figurative language, spelling, punctuation and capitalisation) Word Processing: Average Weaknesses: Ideas, Organisation, Mechanics (Creativity of ideas, organisational pattern, ideas in logical order, spelling & punctuation)
E	Convert Writing Phase	Convert Writing Phase	Did not like writing by hand all that much as she felt that she was not neat	Liked being able to type her stories and she enjoyed writing more	Hand Writing: Strong Weaknesses: None Word Processing: Strong Weaknesses: Mechanics (Spelling, punctuation and capitalisation)	Hand Writing: Strong Weaknesses: None Word Processing: Strong Weaknesses: Mechanics (Punctuation and capitalisation)

	Convent. Writing Phase		Convent. Writing Phase	
J	Did not enjoy writing his stories by hand.	Very enthusiastic when writing his stories using the word processor	Hand Writing; Weaknesses: (Choice of words, figurative language, spelling, punctuation & standard language) — Average/Strong Style & Mechanics. Word Processing; Weaknesses: (Punctuation & capitalisation) — Average/Strong Mechanics	Hand Writing; Weaknesses: (Spelling, punctuation and capitalisation) — Average/Strong Mechanics. Word Processing; Weaknesses: None — Strong
L	Did not like writing, "sore hand", preoccupied with the neatness of his handwriting	Felt very positively about being able to use the word processor	Hand Writing; Weaknesses: (Creativity of ideas, development of ideas) — Average/Strong Ideas & Organisation. Word Processing; Weaknesses: (Punctuation and capitalisation) — Strong Mechanics	Hand Writing; Weaknesses: (Development of ideas) — Average/Strong Ideas. Word Processing; Weaknesses: None — Strong
S	Enjoyed writing by hand as she was able to express her feelings	Felt that she wrote better stories while using the word processor.	Hand Writing; Weaknesses: (Creativity of ideas, development of ideas & variety of sentence patterns) — Strong Ideas & Style. Word Processing; Weaknesses: None — Strong	Hand Writing; Weaknesses: (Creativity of ideas, development of ideas & variety of sentence patterns) — Strong Ideas & Style. Word Processing; Weaknesses: None — Strong

Figure 2. Summary of student results

RESULTS

Research Question One. *What attitudes do seven Year Three students possess in terms of writing and the writing program currently in place in their classroom?*

The Year Three students from this class had a perception about writing mostly couched in terms of neatness. The students thought that if they had neat handwriting, then their writing was good. The teacher praised the students on having neat handwriting and often discouraged (or so appeared to in the students' eyes) those that had messy writing (Student B said that she always gets a three for handwriting which is average on a scale from one to five, one being the highest and five being the lowest). The students were concerned more with neatness rather than the quality of their writing and what they were writing about.

The students did not like the traditional writing lessons that took place in the classroom. Some of the students said that they hated this type of lesson because their handwriting was not neat and so they felt they were no good at it. Others said that they didn't like writing lessons as they got a sore hand due to the constant motion required to complete a writing task, along with the rewriting procedures that took place in their normal writing lessons. One thing that all of the students did agree on was, they all felt some sense of relief when they had actually completed a writing piece.

Research Question Two. *What attitudes do seven Year Three students possess in relation to the use of word processors and writing?*

The classroom teacher had a very high expectation of the students in terms of their neatness of their writing. Consequently, a lot of the students said that they didn't like writing. However, when it came time for them to use the word processor to assist them with their writing, they possessed a very positive attitude towards the word processors and towards writing due to the motivational purposes of the word processing package that was used and the ability of the students to use the backgrounds and pictures that this package had to offer. Also, the students were left with a professional looking, neatly printed version of their story.

By the end of this investigation, the students certainly were keener to participate in writing lessons using the word processors as opposed to having to use paper and pencil. Most of the students remained focussed on their writing through out the word processing sessions and they were more task oriented while using the word processors. All of the students wanted to do more writing lessons using the word processors and were relaxed about having to type. Perhaps this was due to the fact that they did not have to concern

themselves with the mechanics of each of the letters as they wrote them. They did not have to space them correctly, keep them all the same size, think about how to write each individual letter and so on. The computer automatically made the students writing neat and level. All they have to do was push the letter and it appeared on the screen.

The students liked using the word processors to assist them in their writing as they were left with professional looking copies of their work. They did not have to undergo the recopying processes that are often associated with producing a neat product in the hand-writing process. The word processor removed a very demanding task so the students could concentrate on the real task of writing, formulation and recording of their thoughts, and information.

Research Question Three. *How is students' writing development affected when word processors are used?*

While the students were writing by hand, they became quite easily distracted and side tracked, even losing interest after a relatively short period of time. However, while the students were using the word processors, they were more than happy to sit and type their stories, often not wanting to go out to recess or lunch. The students were more motivated to stay on task by the options offered by the word processing package.

The students all produced writing that was of a better standard using the word processors as opposed to hand written pieces they wrote. They composed longer stories, used a better selection of words and put a lot more thought and detail into the stories that were composed at the word processor.

While using the word processor, the students came to see their writing in a fluid state, being able to alter and change aspects as they pleased. They were able to let their ideas flow with the knowledge that they could go back and change things at a later date. This enabled the students to try things out with the understanding that they could delete them if they were wrong, thus enhancing risk-taking behaviour. However, with the traditional method, the students were more concerned about neatness, appearance, and getting things spot on the first time so they would not have to rewrite it. Hence, all of the students said that they would prefer to use the word processors as opposed to the traditional paper and pencil method.

The incorporation of a word processor into the students writing program enabled them to enhance their writing skills. For example, some of the students improved the mechanics of their writing as they could easily go back and change their text with the push of a button. This enabled the students to become more competent at locating their errors that they made. Some of the students even enhanced their writing from being labelled a

weak or reluctant writer while writing by hand, to become an average writer while using the word processor. This could be linked to the word processor being more of a motivational tool, with the students not being limited by the boundaries of the conventional piece of blank paper.

Word processors made a very positive impact on all of the students that were involved in this investigation. If the students could choose between composing their stories using the hand written way or using the word processors, they would all choose to use the word processors. The incorporation of word processors into this Year Three classroom resulted in better constructed stories, students' increased motivation to write stories and students' enhanced risk taking behaviour when writing their stories.

OTHER RESULTS

Effect of Prior Computing Experience

All of the students that participated in this investigation had some prior experience using computers/word processors through their interaction with school computers or through exploration on their home computer. The students were not hampered in any way while using this writing tool as they all knew how to open files (through locating the correct icon), they possessed knowledge of a keyboard (they were able to use the mouse and the keyboard as effective input devices), and they also knew what the disks were and how to use them to save their stories.

Prior computing experience appeared to be advantageous to the students involved in this investigation, as this writing tool did not overwhelm them. Rather, the students appeared to interact with the computer/word processor easily and without anxiety, which enabled them to be left to their own devices to create, edit, and produce their own stories.

Keyboard Skills

The students all possessed quite good keyboarding skills for students so young. The insistence from the classroom teacher that the students learn where the keys on the keyboard were certainly enhanced their ability to complete their stories. Although the students did not use any sort of touch-typing technique, they felt that their method of hunt-and-peck enabled them to type their stories more quickly and easily without having to make the necessary reaches required with their small fingers.

Prior keyboarding skills assisted the students in this investigation, as they were able to concentrate more on what they wanted to say in their stories, rather than on finding the location of keys on the keyboard. If the students did not possess any knowledge of the qwerty keyboard, there was a chance that they would lose their train of thought or ideas while trying to locate the appropriate keys in which to type the individual letters of the words (however one student used pictures as a means of keeping his train of thought!). This could have led to the students not wanting to use the word processors due to the time consuming nature of the input process.

The classroom teacher took the students for computing and she ensured that the students learned and practiced correct keyboarding techniques as she was not a competent typist and she wanted to make sure that her students were. Almost all of the students felt that they were competent typists. Student B started off with her fingers on the home row keys and proceeded to press the buttons down with the correct fingers. However, as the lesson progressed she resorted to the more comfortable method of "hunt and peck." Student S seemed very familiar with the keyboard initially and knew where the majority of the keys were. Generally, the students had a tendency to look down at the keyboard but this didn't seem to hinder their typing ability. Overall the students tended to type with their dominant hand.

The Effect of Being Able to Use Pictures

The students were highly motivated by the word processing package as they felt that these pictures and backgrounds enhanced their stories by making them look more professional. The students' inspiration for their stories often came from *Story Book Weaver Deluxe* (1994), not only from the use of pictures to enhance their stories, but the students found that the many images that this package provided assisted them when they became stuck for ideas or for what to do next in their stories. The pictures provided the students with a window of opportunity to carry on with their stories when their creative thought processes were taking a break.

Change in Attitudes

The students' attitudes towards writing and the writing process changed throughout the period of this investigation. At the start, simply mentioning the word writing made the students cringe with distaste. At the end, however, when the students were able to use the word processor to assist them in

their story development, they could not get enough. They began to enjoy the writing process due to the ease with which the word processor enabled them to complete the writing tasks.

First Steps as a Measure

The First Steps Writing Developmental Continuum (1994) was a measurement tool implemented to determine where the students were located in their writing development. This tool enabled the students to be effectively placed into a phase of development and provided a measure as to what could be expected of the students regarded their writing.

For this investigation, the students all appeared to initially be in the Conventional Writing Phase of Development in accordance with the pieces of writing that the students had produced prior to this investigation taking place. However, after closer observation of the students' abilities throughout the writing process and upon examination of their final writing pieces of work, most of the students were, in fact, in the Early Writing Phase of Development. Only Student S appeared to be on the cusp between the Early Writing Phase of Development and the Conventional Writing Phase of Development.

Checklist as a Measure

The checklist that was applied throughout this investigation permitted an effective comparison to be made between the students' hand written samples of work and their word-processed stories. This checklist enabled the students to be classified as either, strong, average, or weak in terms of their writing ability. Once it was determined if the students were strong, average, or weak for their hand written stories, enabled a comparison to be made to determine if the students' results had improved or decreased with the incorporation of the word processor into the writing program.

Completion Rates

The word processor enabled the students to complete more of their stories during the time that was allocated to them. The students all felt that they could type faster than they could write so they were able to formulate their

ideas more easily while using the word processor. The students did not have to be concerned with the presentation of each individual letter in their stories as the word processor produced them correctly, neatly, and all the same size and height so they only needed to focus on what they wanted to write.

The students completed longer stories while using the word processor possibly because *Story Book Weaver Deluxe* (1994) kept them motivated and interested in the task at hand. The students also came to understand that they could go back through their stories at any time to change any aspect of their story they did not like easily and quickly. This led to the students completing their word processed stories more quickly than their hand written versions as the students were free to put their thoughts down without having to be concerned about editing and rewriting process, as with hand written stories.

Effect on Enjoyment and Confidence

The word processor had an impact on the students' enjoyment and confidence in regard to writing. While writing by hand, a majority of the students displayed a lack of enthusiasm towards the very idea of having to write stories. However, while using the word processor, the students all thoroughly enjoyed the writing process.

The students would often have the computers turned on first thing in the morning and be writing. They enjoyed typing stories using *Story Book Weaver Deluxe* (1994) so much that they often would choose to write alternative stories in their free time. Most of the students that participated in this investigation would choose this method of writing if they could as they all wanted to undertake more writing tasks using the word processor.

Effects on Mechanics

Armed with the knowledge that the students could go back and forward through their stories, students were keener to proof read and edit their stories. They knew that they could do so quite easily and not be forced to labour over them and painstakingly rewrite them. The students became quite proficient at going through each of their pages, reading them through and changing words that they did not like. Also, the students were able to use the spell check facility that *Story Book Weaver Deluxe* (1994) provided so they were assisted while searching through their stories for spelling mistakes. The students simply would work on their stories, typing the words how they

thought they should be spelled and then use the spell check facility to get the words right.

Neatness

The neatness aspect was a huge issue for all of the students, as the final appearance of their work mattered a great deal to the classroom teacher. The students felt that they didn't write good stories because their handwriting wasn't neat. So not only did the students have to deal with developing their ideas in a story, the mechanics and organisation of the words but also on how neat each individual letter was recorded down on the page.

The word processor changed the students' perspective towards the writing process. They no longer needed to be indulgent on the neatness aspect of their writing, rather shifting the focus to the ideas contained in their story with the knowledge that the word processor would make it neat for them. The students were all proud of the professional looking copies of their stories and they were very keen to show their parents and friends what they had achieved using the word processor.

Creativity

The students appeared to be more creative when it came time for them to write their stories with the assistance of the word processor. While writing stories by hand, the students were exposed only to a blank piece of paper looking up at them, offering no motivation or inspiration to write. They were required to rely solely on their background knowledge and personal experiences. However, while using the word processor, the students were exposed to a myriad of images and sounds to enhance their creative thought processes. The resulting stories that were completed using the word processor were more creative and more enjoyable to read.

Time Management

There was a marked difference in the students' time management skills throughout this investigation. While writing by hand, the students that participated in this study would procrastinate by borrowing pencils and erasers.

They would spend time slowly ruling up their page or looking around the room (as if searching for inspiration) prolonging the inevitable story completion for as long as possible. When the students finally started writing, they would remain on task for only around five to ten minutes before becoming easily distracted. Time management while using the word processor was a different story. The students when directed to the word processors, would turn them on and open their story file straight away and begin their narrative as soon as possible. There was no procrastination, no uncertainty, the students simply wanted to write. They were all highly motivated by *Story Book Weaver Deluxe* (1994) and would often remain on task for the majority of the writing session.

The Software Package

The students that participated in this study were all familiar with *Story Book Weaver Deluxe* (1994) as they had used it often throughout their past two years of school. They were not distracted by the numerous pictures/ backgrounds nor immersed in the sounds that this package provided. Most of the students used these facilities to enhance their stories. If the students were not familiar with this package, there could have been a chance that they would not achieve a great deal of writing, rather be taken by the pictures and sounds that are so appealing. Their familiarity of this package ensured that the students writing development was affected positively by the incorporation of the word processor.

Boy/Girl Difference

The stories that were completed by the students were not gender specific. The students were all given the same writing tasks, regardless of their gender and the students that shared the computers were of the same gender. The stories that were completed by the students were of equal merit. The effect of prior computing experience related to whether the students had a home computer, not the gender of the students themselves. This gender specific issue was not raised at all during this investigation. The students were evaluated regarding their writing abilities not their gender.

Conclusion

This investigation has supported the view that "technology can be a powerful tool for students in the writing process" (Klenow, 1992, p. 61), showing that the word processor improved students' quality of writing, a view that is substantiated by Snyder (1994) and Owston and Wideman (1997). The word processor assisted the students by enhancing their creativity, keeping them motivated, improving their style, and producing a more comprehensive narrative. As Bangert-Drowns (1993) discovered in their overview of 28 studies, almost two-thirds of which, "concluded that access to word processing during writing instruction improved the quality of students' writing" (p. 77). The inclusion of a computer in this investigation was certainly "a valuable aid to children's learning" (McGregor, 1984, p. 80) as the students learned that they could employ a different method of story compilation and they all began to enjoy story writing using these word processors.

Incorporating a word processor into a writing program, in this investigation, assisted the students by enhancing their creativity, keeping them motivated, improving their style, and enabling them to produce a more comprehensive narrative. The use of the word processor promoted students' motivation to write, engaged the students in editing, assisted proof-reading, and the students produced longer texts. The students in this investigation, produced writing that was better using the word processor than that which was achieved using the traditional paper and pencil method.

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