Composition Instruction: Using Technology to Motivate Students to Write

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The study investigated the motivational effects of computer technology on writing instruction and performance of 5th-grade students. The participants (students and instructors) were engaged in preparatory sessions to take the Michigan Educational Assessment Program (MEAP) test. Questionnaires on instructor observations and attitudes toward computer usage were administered. Instructor's responses indicate an increase in motivation and writing length for student's who integrated computers into the writing process. Instructors also share the difficulties faced by students with computer literacy issues and also the positive results shown by almost all of the participants. The study notes that students were motivated by computer technology along with other factors like teacher participation, extra-curricular instruction and personalized assistance.

The recent influx of computer technologies into the educational system has produced a quandary for educators on how to integrate these new technologies into the curriculum. This poses a particular problem for elementary school language arts teachers who must integrate the computer technology with the composition process. The relationship between computers and composition creates a dynamic where educators must teach both the technical aspects of using computers and the often times difficult subject of writing. This leaves many educators wondering what are the most effective ways to integrate the two to increase the quantity and quality of writing. Additionally, it

poses a dilemma for school administrators when it comes to testing. In some cases the bottom line becomes whether or not computer technology will increase standardized test scores.

REVIEW OF THE LITERATURE

Recent studies of the relationship between computers and composition have created an ongoing debate over how to integrate new computer technologies into the classroom. On one side of the debate, there are researchers who have declared computer-aided composition the new form of writing, while the other consists of those who remain skeptical about the advantages and disadvantages of using the computer to write.

In their study, "The Impact of the Computer on Writing: No Simple Answers," Blahous, Dybdahl and Shaw (1997), examined the effects of computers on writing with a group of 5th -grade students. They frame the debate saying:

> With the introduction of the microcomputer into the classroom, educators from all ranks thrilled with the promise of children released from the tedium of creating with blunt instruments and freed from the constraints of the fine motor coordination necessitated for the translation of ideas into writing by hand […]. However, despite the promise, the enthusiasm, and our common-sense notions about how the computer could facilitate at least some aspects of the writing process, research regarding the quantity and quality of writing produced by young writers using the computers is scarce and unsettling. (Blahous et al., 1997, p. 42)

Blahous et al. (1997), concluded that it was not necessarily the computer that was the determining factor for students' success at composition. They decided that the most overwhelming influential factor that decided success or failure was the teacher. They wrote, "While the power and the promise of the computer may have temporarily lured us away from that key figure, discussions of quality quickly bring us back to the reality of the classroom and the indisputably paramount position of the teacher" (p. 50).

One of those who expressed reserve about integrating computers into the writing process was Robert Crafton (1996), a researcher at Slippery Rock University. He wrote, "In short, promises that technology would significantly improve student writing quality simply haven't been realized. At most… computers appear to improve students' attitudes toward writing more significantly that they improve the quality of the writing" (p. 318).

Carolyn Dowling (1994) put forth a similar view. In her piece, "Word Processing and the Ongoing Difficulty of Writing" she wrote, "Although the benefits of word processing are widely acknowledged, writing is nevertheless still perceived as an activity fraught with difficulty" (p. 227). Dowling declared that it would be interesting to examine the "impediments" that creating text on a computer might pose for students.

In an attempt to address the heart of the issue Crafton (1996) asks, "The question is why? Clearly, no single set of factors will explain the failure, except perhaps that no matter how you go about it, writing isn't easy to do, and despite our best efforts, it's hard to teach; there are no foolproof pedagogies for teaching composition" (p. 319).

Lois Nichols (1996) conducted one study that focused on both quantity and quality. This study, which was comprised of two sixth grade classes in Maryland, found that computers do help to increase the length of student papers. Nichols wrote, "Students who implemented the traditional method wrote an average of 13.55 sentences per composition, while students who utilized the word processor wrote an average of 21.50 sentences per composition" (p. 163).

Nichols (1996) also dealt with the question of quality. Nichols found no statistical difference between the students that used the word processor and those that composed with a pen or pencil. She wrote, "The overall quality of the composition showed no difference between the two groups…" (p. 164). Nichols also suggested, "As the computer-using students move beyond basic familiarity with the use of word processors and become progressively more adept at keyboarding, the quality of their compositions may improve" (p. 165).

A study conducted with younger second grade students came to a similar conclusion. Ithel Jones (1994) found that the students he studied exhibited improvement in both quantity and quality. Jones found that, "the outcomes of this experiment signify that the use of word processors with second grade elementary school pupils results in an overall improvement in the quality of their writing and, at the same time, the stories by these pupils tend to be longer" (Jones, 1994, p. 52).

The Jones (1994) study is extremely interesting, not because of its findings on quantity or quality, but rather for its attempt to dig even deeper. In this study, the second graders who used the computers to compose originally were brought back again to compose using only a pencil or pen. Jones found that the control group, those that used computers, once again showed increased scores. Jones concluded that:

> This study supports the fact that the use of the word processor facilitates the writing process even with young children. These findings suggest that when these particular beginning writers used word processors there was an overall improvement in their pencil and paper writing when they were away from the computer…Possibly, the facilitative nature of the word processor enables students to focus on the composing aspects of writing, such as content generation and revision. (p. 52)

In fairness, Jones does temper this conclusion by stating that more research would be needed to convincingly prove such a connection. Nonetheless, the idea that computers may be beneficial beyond the initial interaction is clearly even more controversial than the original questions of quality and quantity.

In contradiction to Jones, a study conducted by Richard Collier and Clifford Werier (1995) found no negative or positive after effects when transferring from computer composition to composition by pen or pencil. In their piece, "When Computer Writers Compose by Hand," which focused on much older writers (ages 30–40) they found no measurable difference between the computer and handwritten texts. They concluded that:

> Although there are some minor variations for each writer from one modality to the other, overall the same basic schema persist. Good writers are good writers, no matter how they write—their processes and their products are only minimally tied to the mode of text production, no matter what they say or feel about writing by hand. (p. 56)

Despite Collier's and Werier's (1995) firm conclusion, the question of less experienced writers remains unsettled. According to Collier and Werier, "good writers are good writers," (p. 57) but one is left to question how they came to be good writers. Additionally, we must ask what role computers can play in developing or teaching people to become good writers.

Others worry not about the actual results produced by computer-assisted composition, but are wary of the possible side effects. Some worry about the demise of penmanship like Jean Hoffman (2001), associate editor of Machine Design, who wrote, "Grade school teachers responsible for teaching penmanship admitted that emphasis on good writing technique has fallen by the way side since the introduction of computers in the classroom […]. I strongly agree that an early introduction to technology is important for children. But I also feel there is something fundamentally amiss if basic writing skills get short changed in the process" (p. 70).

Other research suggests that since students are using computers in the classroom to write, the emphasis should not be on hand writing but on computer skills. The thinking, if students are using computers to write normally then they should also be tested on them as well. Researchers at Boston College (2000) found that elementary and secondary school students who used computers to compose an essay for a state standardized test scored higher than those that used a pencil and paper. "Out of a total of 20 points, students scored about 2 points higher when using computers" (Carlson, 2000, A40). In addition, the study conducted in 2000 predicted that if students were allowed to use computers on all of the test questions that required composition, "About 19% of the fourth graders tested would move from 'needs improvement' category to the 'proficient' category" (A40).

The Boston College study also found that students instructed to use the computer to write were at a disadvantage when it came to handwritten tests. Carlson wrote, "students who have been taught to write using a computer don't perform as well on composition exams that use paper and pencil" (Carlson, 2000, A40).

Carlson's study does suggest that students taught on computers who are tested by pencil score lower than similar students tested on computers, but it does not designate a control group that is instructed without computers. It would have been interesting to compare the scores of students instructed on computers and tested on paper and pencil with the opposite control group of those instructed with pen and paper and tested on computers.

Another study by Harrington, Rollins and Shermins (2000) found that length and quality might not be the only ways to measure the value of computer-assisted composition. "Students seem to have positive attitudes toward writing and word processing after working with computers," and, "many students write longer pieces with word processing than with traditional methods" (p. 198).

David Thomas (1989), a 4th-grade coordinator at Dee Elementary school in Utah, detailed an interesting project conducted in 1986 entitled, "I Can Write!" The program provided every fourth grader at the school with access to computers equipped with word processing programs. Each student received 30 minutes of writing everyday over the course of two years. The teachers received 120 hours of inservice that included orientation to the technology along with instruction on the theory of writing. (In the second year, the fifth grade classes were added to the program.) Thomas wrote that they found increased student motivation and an improvement in quality. He wrote, "Writing with computers makes revising and editing fun for both students and teachers. Because it is so easy, students do not dread it, but to

seem to welcome the chance to improve their work" (p. 135). On the issue of quality, Thomas concluded that, "we feel justified in claiming that teaching writing with microcomputers seems to result in a greater improvement in writing than traditional teaching" (p. 139).

The "I Can Write!" project found that students who used a computer were able to increase their scores by an average of 6.85 points at the end of the first year. The control group, students who used only pen and pencil, increased their scores by only 2.4 points. At the end of the second year, the difference was an average increase of 3.2 for computer composers and 1.6 for the control group. (Thomas, 1989, p. 139)

Although the statistical increases that Thomas cited are not overwhelming, they do show a trend that favors computer-aided composition. Despite the results that Thomas terms beyond, "our greatest hopes and wildest dreams," the "I Can Write!" project falls short of predicting reliability across the board. However, the project does provide an example for those that support the use of computers in the writing process. It does nothing but fuel the debate for those who remain unconvinced by the promises of computer technology when it comes to composition.

Although researchers have found varying results concerning the effects of computers on composition quality and quantity, the majority of the research indicates that something is happening. More research is needed to settle the debate over whether computers can help to increase the quality and quantity of writing and by what means.

This debate presents a particular quandary for language arts teachers when it comes to composition instruction. Can computer technology be used to motivate younger students in the area of language arts? What is the value of computer aided composition instruction for elementary age students? Does computer aided composition improve quantity, quality, or both?

The debate over handwritten composition versus computer composition, although heated, is the not the only undecided question on the table. The reality is that the answer lies somewhere in the middle. This compromise is being reached in classrooms across the nation. Educators, for the most part, are not asking if they should use the computer technology but how.

CONTEXT OF RESEARCH

While working as a Language Arts instructor at Merriman Elementary in Romulus, Michigan, I made several observations pertaining to the relationship between computers and composition. The most obvious was the increased level of excitement expressed by students whenever they were allowed

to use the computer. I noticed that even the most disinterested student would often "perk up" when they were allowed to use the computer. Originally, I attributed this increased enthusiasm to the idea that the kids liked the game programs. As I watched further, I noticed that although they did enjoy the games, the students also seemed to like the computers in general. Additionally, it appeared that the students were working on their writing for longer periods of time and complaining less. I was unsure if this was due to the benefits of not having to write by hand or if it was taking more time for the students to get familiar with the computer. As the tutoring program continued I paid increased attention to this interaction.

MICHIGAN EDUCATIONAL ASSESSMENT PROGRAM (MEAP)

As part of preparation for the Michigan Educational Assessment Program (MEAP) writing examination, 5th grade students at Merriman Elementary School were divided into several study groups. The MEAP is the standardized test for Michigan and it encompasses the four main subject areas of math, science, social studies and language arts. As part of the language arts testing, students are assessed at their proficiency in writing. Aside from short essay response questions, the bulk of this assessment is based on the results of writing an essay over the course of three days. Although the sessions were untimed, each session was allotted around 90 minutes.

To begin the exam, students were given a prompt. In this case, the prompt contained a series of questions that asked students to think of a solution to a problem that they have solved, or one they would like to solve. The first session of testing allowed students to do prewriting and drafting. The directions read, "Talk about these questions with your group, making sure everyone gets to speak" (MEAP, 3).

There were additional prompts that asked, "Think about problems people have at your school or in your neighborhood. Are some problems hard to solve? Easy to solve? Fun to solve?" (MEAP, 4).

Students were allowed to talk these questions out with other students. Once students felt they had ample time for discussion they were directed to use an open space in the booklet for prewriting. After completing their prewriting, students were then directed to begin their first draft.

The second session of testing, held on the following day, was used for peer response and revision. Students were allowed to read their rough draft aloud to the same partner with whom they conducted their prewriting discussions with. Their partners were allowed to give recommendations and to critique the other student's work. The peer response session lasted only 15 minutes.

The last session, held on the third day, was used for revisions and producing the final draft. Students were not allowed to communicate with others about their paper. A checklist in the test booklet provided students with their only guidance. The checklist asked questions like, "Do I have a clear central idea that connects to the topic?" and "Do I support my central idea with important details/examples?" (MEAP, 10).

As preparation for the MEAP assessment, Merriman Elementary School fifth graders were divided into study groups. The groups met over the duration of four weeks for an hour each day. Each group consisted of 7 to 15 students and met in a different room. A primary instructor and an assistant led each group. Academically the groups were arranged into high, medium, and low designations based on the recommendations of their homeroom language arts teacher. The standards for these designations were left up to the discretion of the teacher. Despite this process, each group retained some variance of skill level. For example, a student with behavior difficulties might be placed in a low group, despite having the ability of someone in the high group.

As one of the instructors I found myself assigned to one of the computer labs. The computer laboratory was chosen by random, and was designated entirely for the space that it provided. The idea at the time was that since students would be unable to use computers on the test, they shouldn't use them for preparation. The goal of the preparation sessions was to give students practice at the "prewriting-peer review-final draft" format of the test.

POWER WRITING

All instructors were trained in the use of a "Power Writing" program that dealt with writing as a process that could be standardized. The "Power Writing" program, entitled "The 3 Steps to Powerful Writing," was designed by educator Betty Hamilton (1997) as a manual for teachers to follow when instructing students how to write. The program is aimed at all ages, grades K-12.

The program breaks writing down into the following three steps:

Power 1 = Focus or Main idea.
      Power 2 = Supporting Details.
            Power 3 = Elaboration. (Hamilton xiv)

The program would start with a prewriting diagram followed by sentences and then paragraphs. A typical "Power Writing" paragraph would

consist of a Power 1, or topic sentence, followed by three Power 2's, or supporting sentences and finally a restatement of the original Power 1. The prewriting done by each student or graphic representation of this would be (1-2-2-2-1). The basic design of the diagram is as follows (Figure 1):
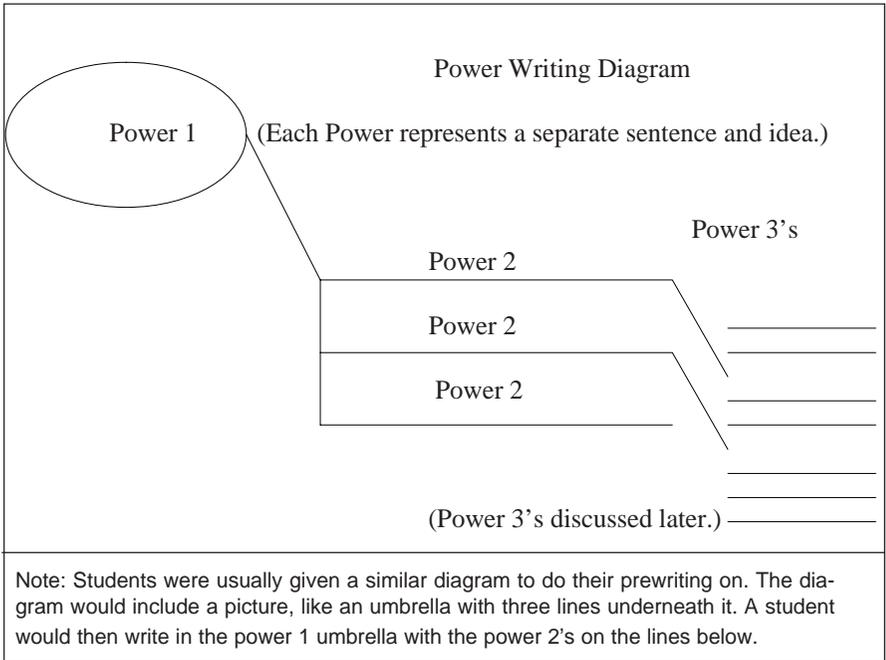
Power Writing Diagram

Power 1 (Each Power represents a separate sentence and idea.)

Power 3's

Power 2

Power 2

Power 2

(Power 3's discussed later.)

Note: Students were usually given a similar diagram to do their prewriting on. The diagram would include a picture, like an umbrella with three lines underneath it. A student would then write in the power 1 umbrella with the power 2's on the lines below.

Figure 1. Power writing diagram

The final product or paper would look very similar to a 5-paragraph essay. The original paragraph would consist of the 1-2-2-2-1 format discussed earlier. The following paragraphs would have a similar format but would be based on the individual ideas in each of the power 2 sentences. The first power 2 would be the basis of the second paragraph and would again be 1-2-2-2-1. Once again this would be using the Power 2 as the topic sentence, with the Power 3's as supporting sentences and restating the original power 2. A very simplified visual representation would look like this (Figure 2):

(Para. 1) Introduction

1- There are three main sports in the U.S.
2- One is basketball.
2- The second is baseball.
2- The last is football.
1- Those are the three most popular American sports.

(Para. 2)
1- Basketball is one of the more fast paced American sports.
2- The clock continues with few interruptions.
2- The scores are very high.
2- Players are active on both offense and defense.
1- Basketball is a very action packed American sport.

(Para. 3)

1- Baseball…
2- Baseball is…
2- Baseball is…
2- Baseball is…
1- Baseball…

(Para. 4)

1- Football…
2- Football is…
2- Football is…
2- Football is…
3- Football…

(Para. 5) Conclusion

1- There are three main sports in the U.S.
2- My favorite is basketball.
2- A lot of people like baseball.
2- The shortest game is football.
1- Those are the three most popular American sports.

Figure 2. Visual representation

Although each instructor was trained to use the program the same way, there is no doubt that instructors were able to implement the program in

their own way. One such example of this variance was the fact that I eventually used the computers to motivate the students to write. Out of the seven instructors who had access to a computer lab, only one chose not to use the computers at some point. Many of the instructors may have chosen to use computers because of the positive results that I relayed during planning meetings. Aside from this difference, many of the instructors also decided to create their own visualizations and proceed at their own pace.

In fact, the author of the program encourages improvisation as she writes,

> My efforts in this manual aim to do what all manuals do: guide and instruct. Please know that I do not believe only one way exists to teach writing—or to teach anything. With the hope that you can integrate the offered strategies with those you already successfully use in your teaching….By altering them, you can make them fit something precious: your writers (Hamilton, xi).

MY GROUP: PERSONAL OBSERVATIONS

As one of the "Power Writing" MEAP instructors I was given a "medium" level group and assigned to one of the computer labs. The computer laboratory was chosen because it provided an open space, not because of the computers. The idea at the time was that since students would be unable to use computers on the test, they shouldn't use them for preparation.

After a couple of days of strictly following the "Power Writing" program and avoiding the computers I made several observations. I noticed that students were spending a considerable amount of time on the process, yet they were not producing anything on paper. Students were able to design outlines for their writing, but were unable or unwilling to develop the detailed outlines into actual writing. In fairness, the two most advanced students were able to produce about one to two page pieces, while the remaining students had difficulty producing a page.

As a reward for positive behavior and hard work, I decided to let the students use the computers to compose their rough drafts for their second paper. (The group would write on one topic for a couple of sessions then switch to another. Instructors attempted to mimic the basic schedule that would be on the MEAP test.) Students again followed the Power Writing process and developed detailed outlines and word webs. When students began to compose their works on the computer using a basic word processing

program on IMac computers, I observed that all of the students were writing longer pieces. The advanced students increased their works to three to four pages, while the others increased to two to three pages. Since they would be required to write their test essays by hand, I instructed students to transfer their computer-assisted compositions over to handwritten works.

I originally attributed this increase to the idea that students were becoming more familiar with the Power Writing program. On the next topic I returned to the original method of using pen and paper only. Once again I found that students were producing much shorter pieces. The advanced students were back to writing about two pages, while the less advanced students were writing a page or less. In addition, other instructors were expressing frustration with the lack of writing by their students. As we met and discussed the progress of the study groups, other instructors expressed some of the same things I was observing. For example, students were able to develop detailed outlines but they had difficulty transferring the information into their writing.

As one of the instructors, Mrs. Smith said, "The students found the brainstorming part the easiest. They could come up with ideas quickly and would discuss them at length with their peers. Sometimes they even did this too much. They might spend a whole hour coming up with word umbrellas but they would end up not writing anything."

Shortly into the project, I secretly distanced myself away from the Power Writing program. Although I still instructed students to use the outlining formula and word webs, I decided to let students choose to use the computer or not. In response to this instruction, all of the students in my group chose to use the computer. Once again, students produced works that were longer in length and they expressed more enthusiasm and excitement toward their works. I also discovered that many of teachers that had access to computers allowed their students to use the technology as well.

I believe that the "Power Writing" program was very effective at providing students with a starting point for their writing. Most of the students were very comfortable with the word webs and eventually learned how the visual prompt represented the form of a paper. I think many of the students lacked the motivation to go from word web to writing. I believe that the students were motivated by the computers to carry out the plans they devised in the word web. It is possible that without the structural knowledge learned from the program, the computer may have made little difference. In addition to this motivating factor, the students appeared to view the process of writing more as a whole rather than concentrating on any particular part. The concept of revision became more than an additional obstacle to overcome to be finished. Students could visualize the chain of events that went from prewriting to revision and eventually to the final draft. It is possible that the

word processor eliminated some of the tedium of revision and enabled students to look beyond it to see the final outcome.

METHODOLOGY

At the end of the study groups, I was convinced that the computer provided a great deal of motivation for the students involved. For this project I intend to prove this very point. It is important to note that I am intentionally avoiding the concept of quality, although the question will come into play. The differing study groups were chosen based on teacher recommendations of their language arts level. Since I had no personal input or knowledge of this process I want to focus on quantity. It would also be wise to put forth that quantity in no way insures quality, but as I will attempt to show, the two are related.

The bulk of my "proof" is based upon teacher observations and MEAP data. Although this approach may not provide the definitive answer in this area, I believe it can provide a valuable starting point for further research on this topic. Once educators and researchers can reach the point of clearly identifying the motivational benefits of computer aided composition, we can then move on to the question of quality.

INCREASED TEST SCORES

Although Merriman Elementary has a school wide "at risk" certification, meaning that at least 35% of the student population come under the government designation of "at risk," it represents a reasonable sampling of varying racial, economic, and social backgrounds. When I first arrived at Merriman Elementary, the school was lagging behind in most areas specifically writing. In 1998-99 only 16.7% of the fifth grade students tested achieved a rating of "proficient" as defined by the MEAP test. The rest of Merriman's fifth graders (83.3%) scored in the lower designation of "not yet proficient." In contrast, students in the Romulus school district scored at 41.9% "proficient" and statewide the level of proficiency was 54.8% (Figure 3). After the 2000 MEAP test scores arrived, I was astounded by the results.

The MEAP scoring rubric for the writing portion of the test designates a scoring system ranging from one to four. Students that score on the high end of the scale, scoring either a three or four, are deemed to be "proficient." Those that score a 1 or 2 are deemed to be "not yet proficient" in the area of written composition.

Merriman 5th Grade Writing MEAP

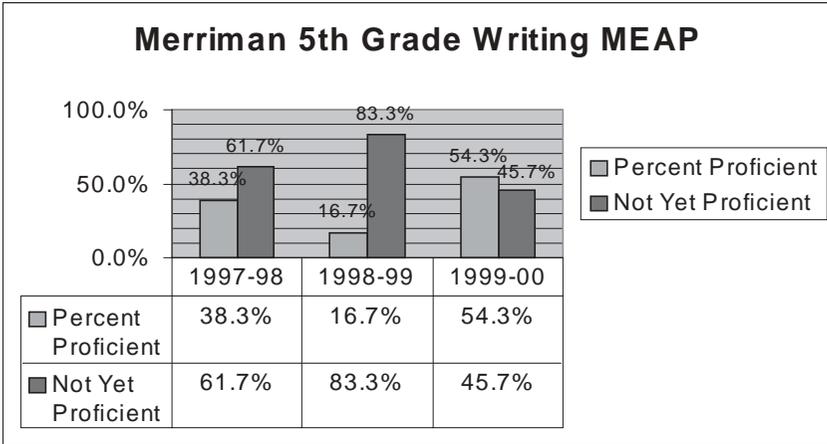|	1997-98	1998-99	1999-00
☐ Percent Proficient	38.3%	16.7%	54.3%
■ Not Yet Proficient	61.7%	83.3%	45.7%

Figure 3. MEAP 5th grade proficiency scores

In fairness, the scores for the preceding years aren't quite as dramatic, but even the three year numbers represent a sizeable increase. The only evidence I could find to explain the dramatic drop in test scores in 1988-1989 was the high turnover rate in principals. From 1997 to 2000, Merriman Elementary had three different principals.

The increases of 1999-2000 were even more dramatic when you considered the case of African American students. Inside of these numbers was an even more disturbing trend. African American students, around 35 to 40% of the entire population, scored even lower than their classmates, with only 5.9% achieving the MEAP designation "proficient."
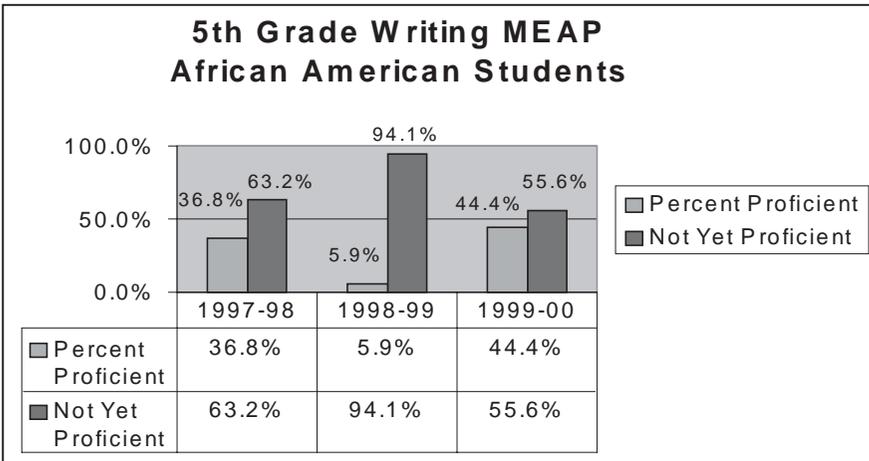
**5th Grade Writing MEAP
African American Students**

	1997-98	1998-99	1999-00
☐ Percent Proficient	36.8%	5.9%	44.4%
■ Not Yet Proficient	63.2%	94.1%	55.6%

Figure 4. African-American MEAP proficiency scores

As the chart indicates, African Americans students were able to increase their scores even more dramatically than the rest of their counterparts. In only one year, their test scores rose from 5.9% proficient to an astounding 44.4% proficient. Even when you account for the rise over a longer span, the three-year increase goes from 36.8% to 44.4%. Almost a 10 point increase, significant without the 38.5% increase between 1999 and 2000. I decided to ask the instructor's why they believed the students performed so well on the 2000 MEAP test.

Although it would be amiss to credit the use of computers with the dramatic increase in scores, it would be equally incorrect to give them no credit. Out of the nine instructors, only two were state certified teachers. The rest of the instructors were required to have a Bachelor's degree but not in the field of education. The two certified teachers were allowed to use their rooms for instruction, and thus they had no access to computers. Additionally, both of the certified teachers were assigned to groups designated as high. The rest of the medium and low groups were assigned to the remaining "uncertified" instructors. This is significant because it means that almost all of the low or medium groups (six out of seven) were able to use the computers. It would be reasonable to assume that the increase in the number of students proficient, include many of these very students.

INSTRUCTOR'S THOUGHTS (INTERVIEWS)

One of the other instructor's who allowed students to use the computer, Mrs. Smith, explained her reason as, "I did it because writing is a real life process that involves more than just stuff on the chalkboard. Using the computer made them see a clean, clear typed project. It also helped them learn computer functions at the same time."

Mrs. Smith, who had a "medium" level group, limited computer access to revision and the final draft stages. She felt that rough drafts should be done in handwriting, allowing students to practice both means of composition. In addition she required students to recopy their final pieces from typed pages to handwritten pages. Mrs. Smith says she wanted students to be prepared to do the actual test by hand. Her students produced pieces ranging from two pages all the way up to seven pages.

I witnessed a similar result as I noticed that as the student's familiarity with word processing increased, they began to focus less on the computer and more on their writing. Many of my students even became excited about writing, as I would over hear them talking in the hallways enthusiastically about a piece or the topic for the next session.

The most dramatic results came with the students that were designated in the low group. Ms. Jendritz, who instructed a "low" group, says that, "At first, my students averaged only about three paragraphs for their first piece. I mean, I had a few kids who had difficulty doing a single paragraph. At the end of the program they were up to about eight to ten paragraphs."

When I asked her what brought on the increase, she responded, "The computer, in effect, gave added interest and motivation within the writing process to students in reaching their final outcomes. The use of technology gives them a sense of empowerment and reward as they go through the writing process."

Another "low" group instructor had a different take. Mrs. Madison says, "We allowed students to complete their final draft on the Imacs. We hoped to integrate our technology with the student's works. Using the computers for the final draft tended to slow the process, but simply because students were not yet proficient in word processing."

I faced a similar dilemma with only one of my students. Because the particular student typed at an extremely slow rate, he had difficulty completing his writing pieces. (In fairness, the same student took the same length of time to write with a pencil.) Despite these difficulties, the student still seemed to enjoy the process. His final piece was two pages long, and he frequently expressed how proud he was of the paper.

Mrs. Madison continued saying that despite the problems with learning how to use the word processors, "Computers made the final draft clean and neat. It also helped them with spelling errors and made the papers easier to read. Students also seemed to take pride in their final product."

There can be no doubt that time was spent toward familiarizing students with computers. It would also be logical to suggest that this time must take away from writing instruction. On the other hand, if this produces a better result of at least quantity, this side effect is negligible. If part of the goal of writing instruction is to inspire and motivate students to write, it is worth spending at least some time on teaching computer skills.

CONCLUSION

It would be unwarranted to suggest that the presence of computers alone could somehow transform students into better writers. The bulk of the credit for the improvement of fifth grade writing MEAP scores should go to the teachers, instructors, and administration at Merriman Elementary School. The renewed commitment to teaching writing, along with the "Power Writing" program, was probably the biggest factor toward the students' success.

As Blahous, Dybdahl, and Shaw concluded in 1997, "thus, with current technology, human guidance and intelligence in terms of facilitating the writing process is being proven to be irreplaceable" (p. 51).

The data indicates that computers should be infused into elementary school writing programs, and that this can be done with positive results. This infusion should not come about without the proper technical training for educators. They will also not be produced without strong training in the area of writing theory and teaching techniques.

In this case it is difficult to determine what role, and how much of a role, the computer played in producing quality. It is far more evident that the computers were able to increase quantity. Although the two are not identical they are very closely related, particularly when you speak of younger students. The first hurdle to be overcome is getting the young students to write in the first place. If computer technology, like word processing, can help in that motivation then it should be used as such.

It is clear that further research needs to be done, especially in the area of isolating the effects of computer-based composition instruction and usage on handwritten composition and the writing process in general. It would also be useful to do integrated research where both computer technology and different programs of writing instruction could be examined to see their effect on one another, and their effect on the writing process in general.

Another key area of possible research would deal with the procedure of testing. If students are more attuned to writing with computers should they then be tested on computers? Although we are a long way from abolishing the pen and pencil, or even deciding that this is even a possibility, the era of using computers for writing is upon us.

As newer and more creative technologies continuously emerge, educators and researchers must work together to ensure their success. Although the debate over this process continues, one thing is clear. The technology is here and now we must decide how it can be best used without damaging the instruction of the writing process that we seek to improve. It is vital to remember that it is the writing process that concerns us the most and not the technology. Where technology is helpful we must embrace it, anywhere that it impedes or hinders writing we must oppose its use. The overwhelming amount of evidence suggests that the negative effects of computer-aided composition are minimal, and ultimately worth the risks.

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