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Implementation of Technology to Enhance Middle School Student Understanding of Quadratic Relationships

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Implementation of Technology to Enhance Middle School Student Understanding of Quadratic Relationships

Abstract

In order to ascertain whether timing and placement of technology within a mathematics unit had any effect on student thinking and understanding, two sets of students were observed during a unit on quadratic relationships. The first group was given instruction in a traditional foundation of quadratics and subsequently incorporated the use of graphing calculators into their knowledge base. The second group learned how to use the calculators for exploring quadratics first and then was taught the theoretical foundation to solidify understanding. It was found that the timing and placement of the introduction of graphing calculators into the unit did impact student understanding. The group who learned a theoretical framework prior to using the technology thrived, while the other group struggled.

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Thesis

Degree Name

MS in Mathematics, Science, and Technology Education

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Literacy Techniques and Ways to Improve Writing in Technology

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Dedication

I would like to dedicate this capstone project for my master's degree to my parents and family. Their unwavering support and love was a crucial ingredient in my success not only in this program but throughout my life and career.

Acknowledgements

I would like to acknowledge all of those individuals that have helped me along the way throughout the pursuit of my master's degree. Also, all those who are directly responsibly for my accomplishments throughout my career. A special thanks to Pat Buttles, a colleague of mine that has been a mentor to me since the day I started teaching at Webster Thomas High School. Also, a special thanks to Ralph Pizzo for being someone to go to with questions and an ear to hear my problems, your support throughout this journey has been unprecedented. Thank you all.

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Literacy Techniques and Ways to Improve Writing in Technology

Being literate and able to write proficiently is such an important skill in today's society. Educators are responsible for the growth of these young adults as they move from school to the work place. But where does it start, where does it begin?

Are technology teachers responsible for increasing the literacy and writing skills of their students? As a physical education teacher, must we spend time in class to write papers? In math class, what's the point of writing an essay? The point is that literacy is of the utmost importance in schools. More schools are pushing for literacy to span over all curricular areas. So as a technology teacher we must teach and produce writing assignments that are both genuine and authentic. According to Piper and Tatum, scant attention was given to the literacy development of middle school and high school students as policy makers, curriculum developers, and school leaders rallied to address the literacy needs of students in grades K-3 (Piper & Tatum, 2006). Writing and literacy are skills that are always being learned. We can never stop being good writers, and this skill must grow and follow us as we mature.

This change is already being implemented into schools. Now, teachers of all curricular areas are responsible for the growth of their student's literacy skills. It is not just up to the English teachers anymore; each subject area must produce pieces of writing to promote the growth of literacy. Do not worry however, this does not mean that all teachers will have to become English teachers.

The goal is to modify the writing to suit the subject area. For example, a technology teacher would not ask for an essay on a piece of literature; but would ask the

students to write a tutorial for the AutoCAD program to produce a specific piece or part. Make the writing relevant to what is being taught.

The goal of this research is to investigate techniques and ways to improve writing, not only in English class but across all curricular areas. Specifically the goal is to look at what exactly literacy is and how to utilize it to increase the writing skills of our students; also to investigate how to increase literacy across curriculums and strategies for increasing literacy as a whole. educators must remember personal experiences with writing and literacy and use them for the betterment of the students. Cooks agreed by stating, "Today, as a teacher educator, I keep those experiences as a constant reminder to teach teachers how to incorporate literacy instructional strategies across the content areas. I help them understand the importance of allowing multiple genres of writing" (Cooks, 2004, p. 72).

Literature Review

This literature review will look at the information found regarding literacy in the classroom. Specifically, it will look at how to increase writing achievement across curriculums, what is literacy and how it is utilized, and strategies to increase literacy. A lot has been published about literacy and writing skills, and this literature review will break down what has been found on the subject in the areas of increasing writing across curriculums, what is literacy and how it is used, and strategies to increase literacy.

Increasing writing across curriculums:

Teaching young children to read and write is one of the toughest jobs in education. “While some children learn to read easily, the challenge lies with the students who do not, with some never seeming to pick up the knack” (Doe, 2005, p. 26). Gone are the days where reading and writing were only taught in English class. Today teachers of all subject areas are expected to integrate literacy in their curriculums.

When content area teachers incorporate writing in all areas of the curriculum—social studies, math, science, vocational education, business, foreign language, music, art, physical education, and language arts—students benefit in three ways: they have a resource for better understanding content; they practice a technique which aids retention; and they begin to write better. (Sorenson, 1991, p. 73)

Effective teachers provide students with procedural or metacognitive strategies for reading, writing, and thinking (VanDeWeghe, 2004). Writing across the curriculum helped students in many ways. It removes students from their passivity. Teachers go from

the dispenser of knowledge to facilitator, aiding students understanding. Also many writing-across-curriculum assignments differ from that of a typical English class. Cross curricular writing activities fall into two general groups:

- Expressive writing appears in learning logs, journals, exit summaries, problem analysis, or peer dialogues, and it allows the students to write in his/her own vocabulary without fear of being corrected.
- Product writing appears in more formal products—essays, test question responses, library papers, and lab reports—most like what students have been taught to create in English class. (Sorenson, 1991)

When confronted with incorporating writing and literacy into their classrooms, most teachers worried about time. How would they find time to incorporate it when they already have mapped out their entire course following the curriculum? Generally, proponents agreed that when teachers incorporate writing in their content areas, the need for review and the need for re-teaching after testing is sufficiently reduced to more than make up the difference. And since expressive writing should never be graded, especially not for grammar or mechanics, teachers do not suffer from increased paper load (Sorenson, 1991). So through minor tweaks and changes, teachers should be able to incorporate writing in their subject areas.

There are many studies that show that writing across the curriculum increases student's comprehension skills and improves higher-order reasoning skills. In one study, low-achieving math students using writing-to-learn techniques improved their state competency test results to a greater percentage than did the average math students in a traditional classroom (Sorenson, 1991). Moreover, a physics teacher saw a steady 3-year

improvement in overall grades when writing-to-learn techniques were incorporated. Most students experienced less apprehension about writing and felt they were better writers—writing more varied, more complex, and more mature pieces—after only a year in a school-wide writing-across-the-curriculum project (Sorenson, 1991). Using writing to help students construct meaning fosters self-expression through the arts (Anonymous, 2002).

What is literacy and how it is utilized?

When looking at literacy Shanahan stated that “reading and writing, as much as any pair of subjects, overlap; that is, they clearly depend on many of the same cognitive elements. You need to know the meanings of many words in order to read or write, for example. You need to know something about how sounds and symbols relate. You need to have some ideas about how text relates to the world” (Shanahan, 1997, p. 13).

There are many myths regarding teaching writing in classrooms other than English class. And as a teacher in other curricular areas the act of teaching the students to write might seem like a daunting task, but there are techniques and ways to teach productive writing. Hansen stated, “ask me which subject I love to teach and I will tell you writing. Ask me which subject I struggle the most to teach and I will again say writing. Teaching writing is a challenge” (Hansen, 2002, p. 26). However, there needs to be some research conducted on this subject before teachers take the plunge and learn how to teach their students to write. District administrators, classroom and lead teachers, and principles must be careful to identify professional development that is ongoing. And, before selecting a writing program, seminar, workshop, or other professional learning

experiences, leaders must look for components that successful programs share and that research supports (Urquhart, 2006).

A writing workshop that does not have the teachers actually write might be a cause for concern. In order to teach proper writing, you need to practice yourself productive writing. Writing groups are a great way to achieve this, they offer members the structure and support to produce meaningful writing. Teachers in writing groups experience:

- Conduct more informed writing conferences with their students.
- Make better instructional decisions when planning.
- Improve their own writing skills.
- Have an increase desire to write. (Urquhart, 2006, p. 30)

Most teachers in content areas other than English do not think it is that important to grade such writing assignments, after all they are not English teachers. However, teachers should grade some of the writing to provide feedback to the students and the encouragement they need to improve. The research shows that writing helps students in at least three ways:

1. They discover ways to understand content.
2. They improve their retention of content.
3. Their writing improves with opportunities to practice. (Urquhart, 2006, p. 32)

Another myth is that writing does not take much class time. It does take time and the benefits of writing in class can be amazing. This was supported by the following.

When students use new knowledge, they understand it better and can apply their learning in new setting. These two ideas from research on learning are reasons

teachers in any content area should set aside time to write in class. (Urquhart, 2006, p. 32)

Building in time to write in class reinforces to students the importance of being good writers, especially when its time for them to join the work force as productive citizens in society. Shosh and Zales stated, the notion of promoting higher-order thinking becomes even more critical in the context of ongoing global problems. As our nation promotes democracy around the world, it is crucial to preserve our democracy at home with a highly literate populace (Shosh & Zales, 2005). The following supports this view.

The National Commission on Writing for American Families, Schools, and Colleges provide results from a survey of 49 state human resources offices. Some of the findings include these:

- Writing is a basic consideration for state hiring and promotion.
- Poorly written applications are likely to doom candidates' chances of employment.
- Providing writing training costs state government about a quarter of a billion dollars annually. (Urquhart, 2006, p. 32)

One aim of the Goals 2000: Educate America Act is to ensure that “every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship” (Lindeman, 1999, p. 83). Moreover, a survey of 120 American major corporations employing nearly 8 million people found that:

- Two-thirds of salaried employees have some writing responsibility.
- Half of all companies take writing to account when making promotion decisions.

- People who cannot write and communicate well will not be hired and are unlikely to last long enough to be promoted. (Urquhart, 2006)

Barlow advocated for a more intimate connection between professional training and the liberal arts, in the hope that future doctors, lawyers, and business executives will be educated in ethics and the social sciences as well as they are in anatomy, and leveraged buyouts (Barlow, 2006). Thus, one can see the importance of writing and why it should be implemented in all classrooms and across all curricular areas.

Being versed in technology will only help to increase the literacy of the students in the classroom.

Integrating technology into the classroom to help promote writing is yet another way to increase the literacy of students. However, teachers who want to integrate technology into their curriculum have to be technology-literate. This means knowing how to use some basic applications, such as a word processor, a graphics program, a database, a spreadsheet, and a hypertext program. It also means knowing how to use a scanner, a printer, a modem, a camcorder, a tape recorder, and a laserdisc player. (Brunner, 1990, p. 12)

This all goes back to time, how much time can teachers set aside to incorporate literacy in such a technologically advanced world. According to Knobel and Lankshear another hurdle in the integration of technology into literacy is the fact that something we wrestle with in our research and writing is the tension we observe between the facility and sensibilities many young people have with digital media and new literacies and the circumstance they often encounter within formal learning settings (Knobel & Lankshear, 2006).

The research showed that there are techniques for the stages of the writing process. They are prewriting, grafting, revising and editing.

Prewriting was considered the period where writers get ready to write – gather information, organize ideas, identifying audience and purpose, and selecting genre. All content-area teachers can ask students to read about a topic in publications other than school texts; Dialogue with peers about topic; Use inquiry to explore a topic more deeply and to clarify what they do and do not know; Identify topics of personal interest; Free-write in unstructured ways that will not be graded; Brainstorm and make lists without censoring their own ideas; and Outline informally or use graphic organizers to frame their thinking.

Drafting was the production stage of getting ideas down and using complete sentences and reflecting the general conversations of writing. All content-area teachers can ask students to put their ideas down in a coherent but not perfect way; continue drafting for homework; and Close their notebooks or set aside their writing once their ideas are down.

Revising was the time when writers review their work, checking for clarity of message, word choice, and organization. All content-area teachers can ask students to place themselves in the role of the reader to find any confusing areas; Turn in their less-than-perfect drafts to allow for resting time; Look together at models, including the teacher's writing; Learn and follow a protocol for peer reviewing; and Use word processing tools to save time.

Editing was the process of checking written work for the conventions of writing and any lingering concerns with voice, tone, and style. All content-area teachers can ask

students to check the quality of their language choices, looking for appropriate punctuation, correct grammar, and proper spelling; Monitor the cohesiveness of their messages, looking at accuracy of facts and use of imagery; Correct their own spelling of content-area vocabulary and other no-excuse words you identify ahead of time; and Refer to a common errors checklist to help avoid grammar mistakes (Urquhart, 2006, pg.34).

Two additional stages – conferencing and publishing – often are included in the process (Urquhart, 2006). Through these techniques, students become better writers and in time more productive members of the adult workforce.

Only one out of five high school teachers believe that students are learning to write well according to research from Public Agenda (Urquhart, 2005). This number is even more staggering when looking at 75% of students who took the 2002 NAEP writing assessment could only write at the basic level as opposed to the proficient or advanced levels. There are however things that can be done, the following are five principals that can be followed to increase the level of writing.

Teachers should be encouraged to use writing in every content area. Having a curriculum that stresses writing helps students learn to analyze, synthesize, and evaluate what they have read or learned in all content areas (Urquhart, 2005). This approach allows students to retain and comprehend information better because they have written about it. And because they are writing more, they will ultimately improve their writing in the process.

Educate everyone in your school about the writing process. Students who reported discussing their writing with their teacher scored higher, the same was true of students whose teachers frequently asked them to plan their writing in advance, write more than

one draft, engage in pre-writing activities, or write in a log or journal, which all practices that the writing process encourages (Urquhart, 2005). By educating the teacher about the writing it will have more meaning to both the students and the teacher.

Insist on measuring learning, rubrics and portfolios are among the most effective tools for writing assessment because they provide students with criteria that describe specific levels of performance (Urquhart, 2005). Writing portfolios are also a great assessment method as well, and they help the teacher handle the paper load. “Key to this writing approach is that the teacher and student collaborate on how best to accomplish the student’s writing goals and direct energy there rather than on the evaluation of a final product” (Urquhart, 2005, p. 46).

Support creative uses of technology, using technology in the classroom can increase project-based learning, higher-order thinking skills, and problem solving ability (Urquhart, 2005). However it is important to look at the software applications being used and ask yourself whether it is truly beneficial to the students. School leaders should evaluate software on the basis of whether it supports the following curriculum objectives:

Does it provide opportunities for student collaboration?

Does adjust for student ability and prior experiences?

Does it provide feedback to the students and the teacher about the student’s performance and progress?

Is it integrated into the typical instructional day?

Does it improve opportunities for students to design and implement projects that extend the curriculum content being assessed by a particular standardized test?

(Urquhart, 2005).

Know and expect others to know the research on writing and learning. There is much research out there on the subject of writing and literacy, and with much of it lacking vigor. If educators have the responsibility to help students develop both competence and confidence in writing, they need to learn what motivates students to write (Urquhart, 2005). “While all of the effective teachers taught their students strategies for approaching reading and writing assignments (e.g., reciprocal teaching or the writing process), only 17% of typical teachers did so” (McGlimm, 2003, p. 706).

Strategies to increase literacy:

There strategies will be discussed in this area; they are scaffolding, increasing literacy through interaction, and journal writing as a teaching technique to promote reflection.

Scaffolding

“In language acquisition research, scaffolding refers to special ways adults may elaborate and expand upon children’s early attempts to use language, thereby facilitating effective communication at a level somewhat beyond the child’s actual linguistic capability” (Owen & Peregoy, 1990, p. 194). The application of the scaffolding notion to classroom literacy events is a logical one, given a view of reading and writing as a natural language activities aimed at communication (Owen & Peregoy, 1990). The following are five criteria that define the literacy scaffolding model:

- Literacy scaffolds are applied to reading and writing activities aimed at functional, meaningful communication found in whole texts, such as stories, poems, reports, recipes.

- Literacy scaffolds make use of language and discourse patterns that repeat themselves and are therefore predictable.
- Literacy scaffolds provide a model, offered by the teacher or by peers, for comprehending and producing particular written language patterns.
- Literacy scaffolds support students in comprehending and producing written language at a level slightly beyond their competence in the absence of the scaffold.
- Literacy scaffolds are temporary and may be dispersed with when the student is ready to work without them. (Owen & Peregoy, 1990, p. 196)

This model is applied by teachers to help students develop literacy abilities, and can be illustrated into two varieties: those that make use of sentence patterns and those that make use of discourse patterns.

Literacy scaffolds that make use of sentence patterns. Owen and Peregoy agree stating.

We define sentence patterns as language patterns that generate questions, statements, or command. The use of sentence pattern activities is well researched and has proven effective with first-language learners... sentence pattern scaffolds have the added advantage of involving the child in a meaningful literacy event. (Owen & Peregoy, 1990, p. 196)

Literacy scaffold that make use of discourse patterns.

A discourse scaffold makes use of language beyond the sentence level, focusing on discourse patterns or structures such as whole stories or essays. Research suggests that assisting readers with discourse structures enhances

comprehension... Similarly, story mapping teaches story structure to children and helps them make predictions, enhance comprehension and retention. (Owen & Peregoy, 1990, p. 197)

Increasing literacy through interaction

“The benefits of continued social interaction can be observed in some schools today; students who have spent at least a portion of class working together – forming a team, actively discussing an issue, or playing a cooperative game – often leave the room in clusters, walking closely with classmates, talking and smiling” (Fredericksen, 1999, p. 118). Building this atmosphere in a classroom where the students feel a sense of ownership in their learning experiences increase many aspects of learning, including literacy. Peregoy and Boyle state that collaborative groups provide peer interaction and support from more advanced English speakers (Peregoy & Boyle, 1990).

These positive attitudes build literacy by encouraging students to take risks as they read and write. When they trust that their efforts will be greeted by a friendly audience, students more willingly read aloud and share what they write... They learn to improve their communications skills as their classmates respond with interest to what is said or written or request clarification and additional information. Cooperative educational communities engaged in interactive endeavors provide the ideal atmosphere for academic growth. (Fredericksen, 1999, p. 119)

Additional benefits of this idea include the students and teachers as a team. The teacher in the cooperative classroom becomes coach, referee, or fellow player... this creates a number of advantages: students accept greater responsibility, work harder, and

teach one another (Fredericksen, 1999). By having the students feel like a part of a community they are more willing to put themselves “out on a limb” and write more freely and expressively. The way students view teachers often changes as play becomes a normal activity and as the student-teacher relationship becomes cooperative rather than confrontational (Fredericksen, 1999). However, the teacher still has significant responsibility in a cooperative classroom environment. To enhance learning, classroom game playing cannot serve as an end in itself; it must be purposeful, relevant, and educational (Fredericksen, 1999).

Additionally, these activities prepare them for the many contemporary careers that require teamwork and the ability to work together toward company goals... Cooperative classroom play can help students explore and shape their own environment as they acquire the necessary tools for long, productive, fulfilling lives. Among these tools are the ability to read and write fluently, tools that develop more rapidly as class members strive to communicate with other members of their learning community. (Fredericksen, 1999, p. 120)

Reading and writing should be directed at real audiences and for real purposes, according to Boloz and Muri (Boloz & Muri, 1994).

Journal writing as a teaching technique to promote reflection

One of the toughest ways to assess your work is through a self-assessment, looking back and reflecting on the learning experience. “Most of the research involving journal writing has been qualitative in nature, with the journal entries analyzed for trends. Davies found that in the process of journal writing, students moved from being passive to active learners” (Walker, 2006, p. 217). Journal writing can have many different

applications based on the goals of the instructor and student. One common use of journal writing is to promote reflection and thought through one-on-one dialogue between the students and instructor (Walker, 2006). Holmes stated that “by recording and describing experiences, feeling, and thoughts, students are able to recreate their experiences for additional exploration” (Walker, 2006, p. 217).

The journals however, need to be authentic and have a purpose. “Keeping a journal or asking for a paper about writing the news story often helps students become more reflexive about their own writing” (Hammond, 2001, p. 76). The following are questions that should be asked by the instructor when contemplating whether to assign journal writing:

What is the purpose of this journal?

Critical thinking, reflection, affective awareness, personal goals, increases confidence, etc.

What is the expected format of journals?

Hand written free form, typed, full sentences required

On what will the students write?

Assigned topics, daily clinical and/or field experiences, decided by students

How much writing is required?

Page limit, word limit, paragraph limit

When will the journals be due?

Weekly, biweekly, monthly, set day of the week

How will the students be given feedback?

Written into the journal, a feedback instrument, conferences with instructor

When do the students need to pick up the journals?

Next day, set number of days after being turned in, or when meeting with the instructor

How will students be graded?

Pass/fail, a grading instrument

Who will read the journals?

Instructors who assign them, shared with other instructors (Walker, 2006, p. 218).

By asking these questions the instructors will create a meaningful and authentic piece of writing that not only challenges the students but also reinforces important concepts.

Figure 1 shows possible journal topics to be given to the students to guide them as they journal their thoughts.

Figure 1

- Potential journal topics

Topic	Subtopics
Classroom experiences	Learning goals Difficult concepts to understand Summaries of day's lesson
Clinical Experiences	Classroom, laboratory, athletic training room Rehabilitation experiences Assessment experiences
Field Experiences	On-the-field assessment experiences Observations Interaction with coaches, patients, peer students, and approved clinical instructors
Communication	Patients, athletes, coaches, fellow athletic training students
Personal Goals	Confidence level, personally and with athletic training skills Time management Career aspirations and goals

(Walker, 2006, p. 218)

Sample of instructor's feedback comments to ensure that the students understand the important concepts and that the writing is authentic and meaningful.

- How did you form this opinion?
- Why did you feel this way?
- Where did you learn this information?
- How did you know this was the right treatment/action?
- Did you consider other ways of handling this situation?
- How often have you thought about this issue?
- What other avenues could you have pursued to handle this situation?
- How will you handle this in the future?
- Why do you feel he/she used this treatment?
- Why did you not agree with this form of treatment or rehabilitation?
- What steps will you take to assist yourself in your next assessment of _____?

(Walker, 2006, p. 220)

The purpose of this article was to provide an introduction to the process of journal writing to promote reflection and we owe it to our students to facilitate their reflection. "As the students grow in self-confidence and gain trust in the instructor, they begin to reflect and write about their real concerns" (Walker, 2006, p. 221). According to Wang and Odell as a result, "various approaches to writing instruction have developed as a result of this expanded view of learning to write and writing instruction" (Wang & Odell, 2003, p. 148).

Summary

This literature review discussed what exactly literacy and writing is and how they can be increased. Writing is such an important skill that gets overlooked more and more often in schools, and if this trend continues our society will be in danger of falling behind in the global economy. Through different ways to increase writing across curriculums and what exactly literacy is and how it is utilized, much can be done to spearhead this trend. For example, using journal writing as a means to reflect ones own abilities and what they have learned. As well as being able to self-assess oneself is an invaluable skill that most students are not learning. Also the integration of technology to help promote the writing process is another way to increase literacy. Most importantly, teachers must promote an open and comfortable environment for their students to write in. Frederickson agreed by stating, "These positive attitudes build literacy by encouraging students to take risks as they read and write" (Fredericksen, 1999, p. 119).

Methodology

The research done for this study was to find out what types of literacy techniques and writing assignments teachers of subjects other than English are using in their classroom to increase the literacy of the students. Since there has been a push in my district to incorporate literacy across all curricular areas, teachers of all subjects need to produce writing assignments in their subject areas to help increase the overall literacy of the student body. The following information describes how the research was done, the setting of the research, and the participants.

Design

The research was done to see what current practices teachers are implementing in their classroom to increase writing and literacy. A survey was given to teachers in the district that taught subject areas other than English to see what techniques they use in their classroom to incorporate writing. The survey asked the following questions:

- What is your curricular area?
- What grade level(s) do you teach?
- What specific classes do you teach?
- How long have you been teaching?
- What types of writing assignments do you incorporate in your class?
- Do you feel that these assignments are increasing the literacy of your students?
- What other strategies do you use to increase the literacy of your students?

The information from the survey was then compiled to see how teachers of all curricular areas other than English used writing assignments to increase the literacy of their

students. It was also looked at to see if they thought that the techniques they were using were effective in increasing the literacy of their students.

Setting

The setting for the survey was up to the teacher that was completing the survey. Surveys were sent to teachers via e-mail and placed in their mailboxes. The surveys were then sent back to me to analyze the results. Consent forms were also given to the teachers to explain the research and to let them know that all information is confidential and will be destroyed after the information was analyzed.

Participants

The participants of the survey were teachers at Webster Thomas High School. The survey was given to select teachers of subjects other than English. The participants ranged from teachers in their first couple of years of teaching to teachers with 20 plus years of experience. This was to get a wide range of results from not only different subject areas but also different experience levels.

Results

This area of the document will go over the results of a survey given to teachers regarding literacy across all curricular areas (appendix A). Although the survey was sent to many teachers only 14 were returned completed. The results were broken down into the questions asked on the survey and then linked back to the findings from the literature review to see if the two correlate. The survey was set up to ask the teachers what types of writing assignments do they use in their classrooms and if they think the assignments they use actually increased the literacy of their students.

Teacher results

The first question asked the teacher what their curricular area is. The reason for this question was to find out what teachers from each curricular area, other than English, responded to the survey. Of the 14 returned surveys 5 were from social studies teachers, 4 were from math teachers, and one a piece from a science, language, music, technology, and business teacher.

The next question asked what grade level that specific teacher taught. The goal was to see at what level the teacher was catering their writing assignment to. Because no matter what level, through certain techniques students become better writers and in time more productive members of the adult workforce (Urquhart, 2006). Of the surveys from only on curricular area the business, technology, music, and language taught all levels ninth through twelfth. Only the earth science teacher dealt with one level, and that was ninth grade. Of the five social studies teachers, three were grade specific and included ninth, tenth and eleventh grade. One social studies teacher dealt with two grades, tenth and twelfth, while the other was all levels ninth thru twelfth. Of the math teachers only

one was grade specific, that being eleventh grade. Two dealt with multiple grade levels, and one dealt with all levels ninth through twelfth.

The third question asked what specific classes the teacher taught. The point was to look deeper at the subject area, not just at a curricular area but what specific courses were being represented in the survey. Was it a lower level course, an AP course, etc? The list is as follows:

Math: pre-calculus, AP statistics, algebra 9, geometry intensive, intermediate algebra, and pre-calculus enriched

Social studies: global 9, global 10, global 10 intensive, you and society, AP world history, humanities, intensive US history and government, and global history and geography

Business: business law, word processing, marketing, sports and entertainment marketing, and human resource management

Technology: CAD, engineering drawing, and architectural drawing

Music: exploring art and music, concert band, and jazz band

Language: spanish 2R, spanish 3 enriched

Science: earth science regents, and earth science enriched

So as you can see there was a wide variety of course addressed in this survey.

Question number four asked how long the teacher had been teaching four. Not only was it important to know specific courses but also know how long they had been teaching them as well. Even the most veteran of teachers struggles with teaching literacy, “ask me which subject I struggle the most to teach and I will again say writing; teaching

writing is a challenge” (Hansen, 2002, p. 26). Again the list of the teachers’ curricular areas followed is by how many years they have been teaching.

Science: 9 years

Language: 10 years

Music: 13 years

Technology: 9 years

Business: 7 years

Social Studies: 23, 11, 10, 9, and 5 years respectively

Math: 18, 17, 10, and 8 years respectively

Again you can see a wide variety of expertise ranging from 23 years in the teaching field to 5 years teaching

Question five got to the heart of the survey asking what specific writing assignments were incorporated in their classrooms. Being a technology teacher I used a couple of writing assignment ranging from tutorials (appendix B) to R.A.F.T.’s (appendix C), my goal was to see what other types of writing could and is being used. The science teacher used lab write-ups and opinion questions that they had to back up with evidence from the internet. The language teacher used composition writing, translations, original skit and short story writing, outlines and note taking. They also stated that they use writing everyday in class. The music teacher used short essays, research reports, worksheets, self and peer evaluations, and music terminology sheets. The technology teacher used a tutorial writing assignment to provide a written set of directions to accomplish a specific task. The business teacher was quite vague with their response but noted the use of FCA’s (focus correction areas) to look for understanding of the content.

The social studies teachers used a wide array of writing assignments to increase the literacy of their students'. They are editorials, journals, short answer, pre-writing, document based question (DBQ) essays, thematic essays, primary source document analysis, letters home, dialogues between historical figures, raps, songs, creative writing, and analytical essays. The math teachers used some writing assignment but were rather scarce compared to the rest of the surveys from the other curricular areas. They used analytical thinking, review brochures, applied geometry problems, think-pair-share method, compare and contrast essays, and journals. So as you can see there are many different types of writing assignment that are being used in the classroom.

The next question asked the teachers whether or not they feel that the writing assignments they are implementing in their classroom are really working. The answers ranged from a definite yes to an I hope so. The language teacher stated "yes, there is a huge jump from what they can do and say from September to June. The technology, music and business teacher agree with the language teacher that the writing assignments that are using is increasing the literacy of their students'. One social studies teacher feels that maybe the DBQ is increasing their literacy since the students need to develop an answer based on a primary source document that usually contains higher level vocabulary words. Another social studies teacher agreed with the use of the DBQ stating, "kids need to organize their thoughts and provide specific, relevant evidence to prove their stance." One social studies teacher thought for the most part the writing assignments help but was worried that another integral part of literacy is being left out, reading! Two of the math teachers agreed that the writing help increase the literacy of their students. The one stated, "I think these assignments perpetuate a thought process and awareness for the

students that reading, writing, and providing proper explanation are necessary to be academically successful and knowledgeable students.” “Better thinkers are better writers” according to the other math teacher. However there were some difficulties with some of the math teachers. One thought that it is “somewhat” increasing literacy but explains that it is difficult to incorporate writing into the math curriculum. While the other math teacher doesn’t look for an increase in literacy, rather an increase in the comprehension of math skills. All though the answers to these questions ranged I think it is safe to say that the majority of teachers felt that incorporating writing into the classroom increases the literacy of their students.

The final question of the survey asked the teachers if there are any other strategies they use to increase the literacy of their students. The goal was to uncover some strategies that weren’t found in the literature and bring them to light. It was somewhat unanimous that those that answered the question all agreed that vocabulary was an important part in increasing the literacy as well.

Discussion and Conclusion

The purpose of this study was to look at ways to increase literacy of students in classes outside of English. The research was conducted to uncover what teachers of all curricular areas are doing to implement writing in their classroom in hopes of increasing the literacy of their students.

The first section of the literature review talked about increasing writing across all curricular areas and the benefits of doing so. According to the literature, “when content area teachers incorporate writing in all areas of the curriculum—social studies, math, science, vocational education, business, foreign language, music, art, physical education, and language arts—students benefit in three ways: they have a resource for better understanding content; they practice a technique which aids retention; and they begin to write better” (Sorenson, 1991, p. 73).

The research conducted directly correlates to those findings. The majority of teachers responded with an overwhelming “yes” that the writing assignments they were implementing in their class increased the overall literacy of their students. The other parts of the literature review covered what is literacy and how it is utilized and by the responses from the survey there are many way and techniques to utilize literacy in the classroom. This agrees with the research specifically, Effective teachers provide students with procedural or metacognitive strategies for reading, writing, and thinking (VanDeWeghe, 2004). According to Sorenson, “There are many studies that show that writing across the curriculum increases student’s comprehension skills and improves higher-order reasoning skills. In one study, low-achieving math students using writing-to-

learn techniques improved their state competency test results to a greater percentage than did the average math students in a traditional classroom” (Sorenson, 1991).

The last section of the literature review went over strategies to increase literacy. Looking back on the results of the research the list of strategies that was generated was quite extensive.

The results of the study showed that much is being done in today’s classroom to increase the literacy of our students. As stated in the literature review, having a highly literate population is a must in today’s rapidly evolving global community. “The notion of promoting higher-order thinking becomes even more critical in the context of ongoing global problems. As our nation promotes democracy around the world, it is crucial to preserve our democracy at home with a highly literate populace (Shosh & Zales, 2005).”

Even though a lot of information came about through the action research, the sample audience was rather small. If a change were to be made it would be to increase the sample of actions research participants, to get a broader scope of what is being done to increase the literacy of students’. Also, including English teachers as a part of the sample group might be a good thing to compare and contrast between what is being done in the English classes as apposed to all other curricular areas. Expanding the survey to include more questions about what can be done to increase literacy instead of asking what teachers currently do and whether or not it works.

This study should inform readers about the importance of literacy in schools and what can be done to increase it across all curricular areas. As stated in the literature review, gone are the days where reading and writing were only taught in English class. Today teachers of all subject areas are expected to integrate literacy in their curriculums.

The research was provided to give support of the importance of teaching literacy in all areas, and strategies for doing so.

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Appendix A

Increasing Literacy across all Curriculum Areas

Teacher Survey

Date: _____

1. What is your curricular area? _____
2. What grade level(s) do you teach? _____
3. What specific classes do you teach? _____

4. How long have you been teaching? _____

5. What types of writing assignments do you incorporate in your class?

6. Do you feel that these assignments are increasing the literacy of your students? _____

7. What other strategies do you use to increase the literacy of your students? _____

Appendix B

Writing Assignment

Tutorials

Auto CAD II

What is a tutorial?

- Something that provides special, often individual instruction, especially:
 - A book or class that provides instruction in a particular area.
 - ***Computer Science.*** A program that provides instruction for the use of a system or of software.

*id/terms-from-dictionary.com

What are you doing?

- You will be creating a tutorial for problem 3 on page 371, you are starting the tutorial as if AutoCAD is already open.
- You will work by yourselves!
- Once you finish the rough draft, pass it on to a classmate to correct for you. Once you get it back with corrections, fix the rough draft and hand in both the final copy and rough draft.
 - Number list
 - Bulleted list

FCA's

- Correct sequential order of commands (20 pts.)
- Correct use of AutoCAD vocabulary (10 pts.)
- Use of bulleted or numbered list of steps (20pts.)

Appendix C

Writing Assignment

This writing assignment I will be asking you to create is a RAFT! What is a RAFT you might ask? We'll a RAFT is an acronym that stands for:

- **Role of the Writer** - Who are you as the writer? Are you Sir John A. Macdonald? A warrior? A homeless person? An auto mechanic? The endangered snail darter?
- **Audience** - To whom are you writing? Is your audience the Canadian people? A friend? Your teacher? Readers of a newspaper? A local bank?
- **Format** - What form will the writing take? Is it a letter? A classified ad? A speech? A poem?
- **Topic + strong Verb** - What's the subject or the point of this piece? Is it to persuade a goddess to spare your life? To plead for a re-test? To call for stricter regulations on logging?

Your role is a writer for a local newspaper, your audience is the readers of the newspaper, your format is a newspaper article and your topic is the first successful balloon flight with live passengers. Basically you are to put yourself in the role of a writer for a newspaper who was on hand for the Montgolfier brothers first balloon flight with live passengers. You are going to write an article about the history making flight. Your article must include:

- Where and when
- Information about the brothers (brief background)
- Information about the flight (how long was it, who were the passengers, how did it work, etc.)

It could also include:

- Description of the day (cloudy, rainy, clear, etc.)
- The size of the crowd (who else was there?)
- Your own opinion of the flight
- Possibly a picture!
- Anything else you might think of!

FCA's

- Chronologically correct information.
- Correct technical spelling.
- Correct use of the RAFT.