

**THE IMPACT OF TECHNOLOGY ON  
EMERGENT EXPOSITORY WRITING IN A GRADE ONE CLASS**

by

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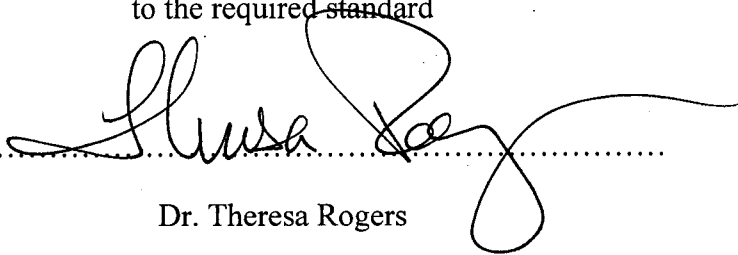
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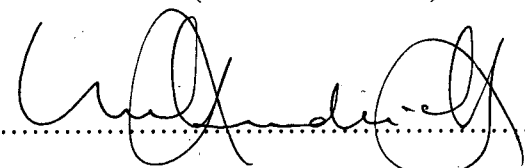
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**Abstract**

Technology has become an integral aspect of society and education. Young children arrive at school with rich technological experiences and resources. This study looks at the impact that technology has on the development of emergent expository writing within a thematic Science unit of study on the rainforest. Fifteen grade one children participated in this study. Both print-based and digital writing samples were gathered over a five week instructional period and analyzed for key features of expository writing. These features included use of objective language, description of information, subject specific vocabulary, and conventions of writing. The findings revealed that digital writing experiences increased engagement and interest. The results also indicated the print-based writing samples produced texts of greater length than the digital writing samples. Finally, the findings showed that in regards to the four features of expository writing, more digital writing samples fell within the beginning and developing stages while the print-based writing samples had significantly higher occurrences at the highest end of the scale for each feature. A discussion of the significance and limitations of these findings follows. The impact of technology, including both advantages and disadvantages, on the development of emergent expository writing is discussed. Educators may wish to consider these implications as they integrate the use of computers and technology into writing instruction for young students.

*Keywords:* technology, writing, Grade One

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### **Study Purpose**

Children growing up in the 21<sup>st</sup> century are coming of age in a technology-centred world. Computers and other forms of technology have become an everyday part of children's lives. Over the past several years that I have taught Grade 1, I have noticed increasing competence in computer use in my young students. I have observed that each class of students is more proficient at using a mouse and locating letters on the keyboard, as well as having a greater general understanding of technology, than the one before. My students and their families use technology to communicate with international relatives, to find information online, and for pleasure. They are arriving at school with rich experiences in digital communication and multimedia.

As students learn to read and write in an increasingly technological age, it is becoming more important for children to develop competence with digitally-mediated text, as well as engage with traditional print sources. In my classroom, I have explored a variety of ways of using technology for literacy instruction. From software that reinforces phonemic awareness and reading readiness skills to using computers as a writing tool, I have observed my students' enthusiastic responses to using technology in school. But I have often wondered how technology can most effectively be integrated into primary classrooms to support literacy development in emergent learners, specifically in the area of writing. Thus, my research seeks to better understand how educators might take advantage of technology to support the writing development of young learners within the context of a Science thematic unit.

### **Research Question**

Within a Grade 1 thematic science unit, what impact, if any, do digital resources, such as websites, PowerPoint presentations, and KidPix, have on emergent expository writing?

### **Literature Review**

#### **Defining digital literacy**

The term *literacy* has evolved over the decades. Traditionally, literacy and literacy instruction have focused on reading and writing print-based texts and are concerned with the cognitive processes that allow people to code and decode text. More recently, sociocultural perspectives have broadened our insight into literacy to include practices for communicating within social and cultural contexts (Nixon, 2003). However, the 21<sup>st</sup> century offers a changing cultural landscape that revolves around information, communication, and technology. New media and modes of communication are emerging. Reading online, internet searching, emailing, blogging, instant messaging, and viewing images and videos on the internet are only some of the new literacy practices that have emerged in this digital age. While teaching children to read and write continue to be paramount goals of literacy instruction, conventional understandings of literacy need to be redefined to include new modalities of representation (Burnett, 2009; Merchant, 2007).

In light of new technologies and changing textual forms and as educators, researchers, and policy-makers attempt to characterize what it means to be literate in the 21<sup>st</sup> century, there is much discussion and debate over how literacy is defined, (Smolin & Lawless, 2003). The term *digital literacy* is used in a variety of different ways in current literature, resulting in multiple conceptions and ambiguous assumptions (Ba, Tally, & Tsikalas, 2003; Merchant, 2007). For

some, being digitally literate means being competent in skills and demonstrating comfort with specific technological tools, such as word processors or search engines. For others, digital literacy is used interchangeably with information literacy, referring to the ability to find, evaluate, and synthesize information and identify sources (Ba et al, 2003; Smolin & Lawless, 2003). Still others argue that since text cannot be understood apart from its context, technology introduces new contexts and social practices, thus creating new literacies (Nixon, 2003). This view of digital literacy is complex and contends that there are “significant differences between print literacy and new media and online literacies” (Nixon, 2003, p. 38). Technology facilitates multiple modes of meaning making, thereby requiring different symbols and systems of representation. Although reading and writing print-based texts are important, Smolin and Lawless (2003) maintain developing multimodal literacies is also essential.

Given the competing discourses surrounding the definition of digital literacy and its relation to traditional print literacy, Merchant (2007) cites Kress’ argument that, “lettered representation is a central defining feature of literacy” (p. 120) and asserts that any definition of digital literacy should centre on written (symbolic) representation. Merchant (2007) defines digital literacy as, “the study of written or symbolic representation that is mediated by new technology” (p. 121). He situates his definition within the social and communicative practices technology permits and acknowledges the shifting textual forms technology creates. Merchant (2007) differentiates between print literacy and digital literacy in terms of processes, surfaces and spaces of production, and consumption, but suggests that the common ground between the two is writing.

**Digital writing and emergent learners**

Given that written representation plays a vital role in bringing together digital and print literacies, and that young children are developing writing abilities in a digital world, it is important to examine the implications computers and technology have on young children's emergent writing. For young children, writing begins as they compose through art, drawings, drama, and play. Early education professionals design programs that provide children with a variety of tools, such as pencils, paper, crayons, and paint, and as young learners explore meaning making with these tools, they develop concepts of print and learn the conventions of writing. With the prevalence of computers in schools, children have another medium through which to compose and create meaning (Yost, 2003).

*Digital writing* refers to alphabetic meaning-making practices that are digitally mediated, whether those practices involve the use of laptop or desktop computers, online or offline practices, word processing or messaging software (Merchant, 2008). Large-scale studies have shown that children have rich encounters with digital writing, both within school and outside of formal learning environments, and students bring digital experiences from which to draw on (Merchant, 2008). Sociocultural theorist, Anne Dyson (2003) observes that young children appropriate childhood cultural practices and material, including media, into their school-based writing. This would suggest that digitally-mediated literacy practices may also be included in the literacy resources that children bring to school.

Currently, few studies exist that explore digital writing in early literacy education contexts. Often the literature addresses whether computers are beneficial or detrimental to early childhood development or motivational factors of technology (Burnett, 2009; Yost, 2003). In a comparative study, Yost (2003) examines how writing behaviours in kindergarten children

developed as students engaged in writing activities on the computer and used traditional writing implements. She observes that children develop understanding of print and acquire similar skills regardless of whether they used traditional materials or computers. She does suggest, however, that some skills, such as the use of spaces between words and punctuation were better demonstrated by children using computers, and concludes that computers are effective writing tools.

The prevalence of technology has pedagogical and instructional implications and raises issues that educators and policymakers need to address. Questions that are currently being contested include whether technology is a medium for literacy or a means to achieve literacy, or both (Merchant, 2008). Another important, and practical, question is, if computers and technology are effective tools to support writing development, how can teachers create learning environments that include technology in early elementary classrooms?

### **Models of instruction for emergent digital writing**

As computers have become commonplace in early primary classrooms, teachers face the challenge of utilizing this technology to support writing development in their students. Teachers approach the use of technology from many perspectives. In early elementary grades, some teachers use computers to build isolated reading and writing skills, while others see computers more as a context for learning than as a resource for learning (Merchant, 2008; Smolin & Lawless, 2003).

Several models of instruction have been suggested for implementing technology to support emergent writing (Merchant, 2008). In many systems of education, curriculum goals for beginning writers often emphasize pencil and paper as tools for writing, and computers as

supplemental to traditional writing instruments. Once students have mastered conventional writing processes on paper, computers are introduced and become an extension of writing. While this is a widely adopted model, it fails to value the digital experiences children bring to school, creating a dissonance between school and home practices.

Another model for instruction places equal emphasis on traditional and new technologies for creating meaning, creating parallel paths of writing development (Merchant, 2008). For instance, children would learn to recognize and form letters, at the same time locating them on the keyboard. This model assumes that writing development progresses in a predictable pattern. However, Dyson (2003) points out that there are multiple entry points in writing development.

A third possible framework would be to integrate traditional tools and new technologies in the curriculum. This model provides even the youngest students with opportunities to engage with different writing tools and to make decisions about which tools to use in order to meet their writing purposes. Such a model allows students to explore a wider variety of tools, such as videos, images, and audio to communicate meaning and would draw upon multimodal literacies (Smolin & Lawless, 2003). This framework offers much potential in educational settings, but will require reconceptualizing curricular goals to reflect a broader, more complex understanding of literacy (Merchant, 2008).

### **School-based digital resources**

Although much is written about evaluating and using software designed for young children, little has been developed with writing development in mind (Merchant, 2008). Authoring programs are available and various studies utilize different kinds of software. In studies involving young children two commonly used software programs are KidPix (Merchant,



2008; Yost, 2003) and Microsoft PowerPoint (Parette, Hourcade, Boeckmann & Blum, 2008).

KidPix is a child-friendly writing and drawing program that offers young students an additional tool to compose with. It also includes features that allow children to create their own slideshows. As children become familiar with using the program, they can manipulate the features in order to create works of writing to meet their purposes for writing aimed at different audiences.

PowerPoint is another software program that presents teachers with a powerful instructional tool (Parette et al., 2008). While creating PowerPoint presentations may be too sophisticated for young children, the software offers features that engage early learners. Teacher-created presentations can be used to teach emergent literacy skills such as, phonemic awareness and comprehension, but can be extended to teach subject-specific content. The many features of PowerPoint, including colour, pictures, animations, slide design, and slide transitions enhance student engagement and interest and increase motivation (Parette et al., 2008).

### **Current research**

There is a surprisingly small body of research available concerning digital literacy and young children's writing (Merchant, 2008; Yost, 2003). What little research that is available addresses children's narrative writing. I aim to add to the corpus of literature by investigating the impact of digital resources on young students' emergent expository digital and print writing within a science thematic unit. My research draws on Merchant's definition of digital writing and adopts the integration model of instruction for digital writing. Using commonly available software as digital resources, I seek to consider the impact these resources have on children's writing development as they explore using both new technologies and traditional tools for writing.

### **Methods**

In order to examine whether or not digital resources affect young children's expository writing, I conducted a qualitative teacher research study using the principles and processes of action research. Action research is a reflective process in which participants examine their own educational practice systematically and carefully using the techniques of research. It is designed and conducted by practitioners who analyze the data to improve their own practice (Madison Metropolitan School District, 2009). Action research allowed me to engage in inquiry and apply research methods to an area of personal and professional interest. With the intention of examining the effects of technology on emergent expository writing in my own Grade One classroom, the themes and patterns that emerge from the data will inform, guide, and improve my own practice. While the findings from an action research-based study cannot be generalized to populations beyond the subjects involved, there is value in sharing the results of this project with my immediate teaching community, which may have the potential to inform and transform instruction at a school-wide level.

Upon identifying my research question as examining how the use of digital resources impacts non-fiction writing of Grade One students in the context of a thematic Science unit, I designed and implemented a five week study involving the students in my own class. The purpose of this study is to understand the influence digital resources, such as websites, PowerPoint presentations, and child-friendly drawing and writing software (KidPix), will have on the development of non-fiction writing in young learners, within a thematic science unit of study about the rainforest.

**Research Site**

The site for this study was an independent school located in a suburb of a large multicultural city in Western Canada. The school has a population of over 850 students from preschool to Grade 12. There are three separate campuses for the elementary (pre-K – Grade 5), middle (Grades 6-8) and secondary (Grades 9-12) schools. Because parents are required to pay tuition in order for their children to attend the school, the students come from upper-middle class families. A significant immigrant population exists at this school, with 85% of families originating from Asia. The school has a positive reputation of high academic achievement and consistently ranks in the top 1% of schools in the province, based on the Foundational Skills Assessment. This research study involves one Grade 1 class and one teacher.

**Participants**

All twenty-one students in the class participated in the instructional activities, but only those who gave assent and whose parents granted consent were included in the data analysis. In total, the study had 15 participants. Of the fifteen participants, five were female and ten were male. The ages of the students ranged from 5 years and 11 months to 6 years and 9 months. Though nearly half of the participants (7 students) are English language learners who speak some dialect of Chinese at home, all the students that participated in the study have a functional understanding of, and an age-appropriate ability, with English.

**Procedure**

Over a five-week period in November and December, I implemented a thematic unit on the rainforest for my Grade 1 class that integrated technology in the delivery of content. Through viewing websites and PowerPoint presentations, the students learned about the diverse animal life of the rainforest and the features of this unique ecosystem. Each week, a teacher-created

PowerPoint presentation, highlighting specific characteristics of the rainforest or animals that live in this habitat, was shown to the students. During the weekly forty minute period in the computer lab, the students viewed this presentation, which included images, links to websites, video and audio clips, and text. The students engaged in oral discussions concerning the interesting facts they learned about the animal and how it is adapted to its habitat. After viewing the PowerPoint presentation and participating in the discussion, the students were asked to demonstrate their understanding of the content. Because drawing facilitates meaning making in young emergent writers as they compose text (Levin, 2003), the students were asked to create a picture using the KidPix program and then add text to the illustration. The students previously had many opportunities to use this software prior to the instructional unit and were familiar with the features of KidPix. Students' digitally-mediated writing samples were saved, printed, and collected for analysis.

Over the course of the instruction, the students were introduced to the language features of non-fiction writing, such as including subject-specific vocabulary, using objective language, and offering detailed factual information. They were given opportunities to write in expository form using conventional writing media. Given that the students had learned about a rainforest animal during the computer lesson, they wrote about the animal presented in the PowerPoint presentation. The students were encouraged to write as much as they were able and given as much time as they required to complete their writing and illustrations. Writing samples from the beginning, middle, and end of the instructional period were collected for analysis.

**Data Sources and Data Collection**

Several sources of data were collected over the five week instructional period. These included samples of student writing, classroom observations and anecdotal notes, and written notes from conferencing with students about their experiences.

**Writing samples.**

Samples of individual student writing fell into two categories, print-based and digital. Multiple samples were collected from each student for the duration of the instructional unit. These were collected at the beginning, middle, and end of the unit for analysis and as a record of progress.

***Print-based writing samples.***

Print-based writing samples were produced in the classroom, usually once or twice a week. Following a lesson on the features of non-fiction writing, students were given time to apply their new knowledge to their own writing. Due to the flexibility of scheduling in the classroom environment, time was not a limiting factor. Students who did not finish writing in the allotted period were given time throughout the day to complete their work. The students were required to produce written text and an illustration to demonstrate their understanding of textual features and specific content. Each student produced between 5-7 writing samples. In total, 88 pieces of print-based writing were collected.

***Digital writing.***

Digital writing samples were created during the class's weekly scheduled computer block. Once a week, the students had forty minutes of allotted time in the computer lab. During this time, the students viewed the PowerPoint presentation, engaged in discussion, and produced an

individual writing sample. Each student had access to their own computer and they were required to draw a picture and add text to describe their illustration. Because of time limitations and constraints involving access to computers, all writing was required to be completed during the scheduled period. Each student produced between 3-5 samples, and in total, 64 pieces of digital writing samples were collected.

### **Teacher observations.**

Written observations were recorded throughout the instructional period. These observations and anecdotal notes were recorded in my research journal. It was difficult to document my observations during writing sessions because the students often demanded my attention. Rather, I was able to jot notes in my journal at the end of the session or at the end of the day. These notes focused on personal reflections of the successes and challenges of the lesson and the use of technology, observations about individual student progress, and interesting student comments or questions, as well as triumphs and frustrations with the research process. Entries were made several times a week. A total of ten pages of written notes were made. Because this thematic unit was part of my regular instruction, I observed all students during the writing process and kept teacher anecdotal records used for assessment and progress reporting to parents.

### **Student conferences.**

The students were interviewed to ascertain how young students perceive the use of technology in school and what impact this may have on affect or motivation. To assess what the students learned and how they found the experience of viewing PowerPoint presentations and using KidPix, I conducted brief individual student conferences and kept written notes during the discussion. Due to time constraints, the conferences were limited to approximately one minute

per student and conducted over several days. Each student was asked the following two questions:

1. "How did you feel about using computers to learn about the rainforest?"
2. "What did you like or not like about using computers?"

Student responses were recorded on a chart in note form, resulting in single page of remarks. All students participated in the conferences; however, only the responses of the fifteen study participants were used in analysis.

In sum, data sources for this qualitative case study include (a) writing samples, print-based and digital samples; (b) notes on classroom observations; and (c) student conference responses.

### **Data Analysis**

A substantial amount of data was accumulated during the instructional unit. To facilitate the examination of this considerable quantity of data, the information required organizing to prepare for analysis and coding.

### **Organization.**

Each print-based writing sample was collected as it was completed, while all digital writing samples were saved to disk and a hard copy was then printed out and collected. All writing samples were stored until the end of the unit. Once all the samples were gathered, the data were separated into two categories; print-based writing and digital writing. Print-based writing samples were collated chronologically by individual student. For instance, all samples produced by Student A were compiled and sorted in order of completion. This allowed for the investigation of potential trends for individual writing development as a result of the instructional unit. Digital writing samples were organized and sorted chronologically, in order

to reveal trends that emerge over time. Results from classroom observations were sorted chronologically and notes from student conferences were typed and arranged by student.

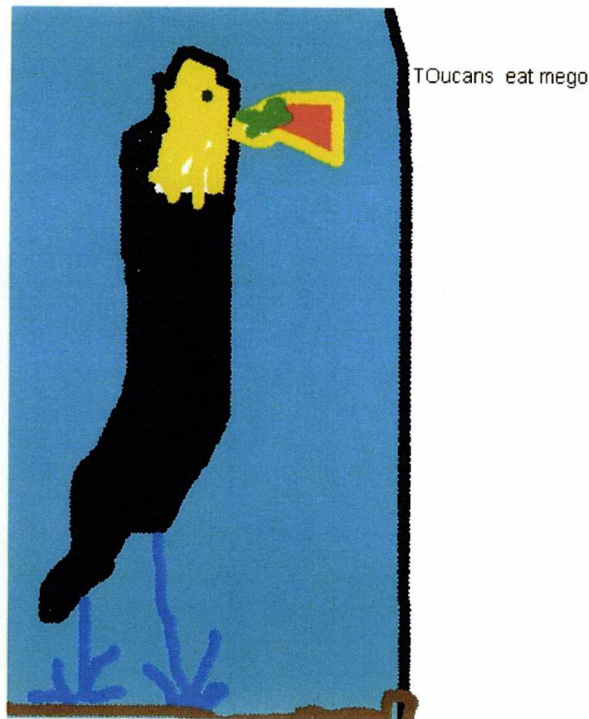
### **Coding.**

To code the writing samples, the British Columbia Ministry of Education Writing performance standards for Grade 1 (BC Ministry of Education, 2009) and the “Writing to Describe” rubric from the First Steps writing program (Bain et al., 2008) were used. These pre-existing codes were selected for several reasons. The BC Ministry of Education Writing performance standards (BC Ministry of Education, 2009) focuses on criterion-referenced assessment in which students’ performance is compared to explicit criteria. These standards were developed by a significant number of BC educators describing age-appropriate expectations in writing. The First Steps “Writing to Describe” (Bain et al., 2008) rubric was used because the features of non-fiction writing taught in the instructional unit were selected based on this framework. The First Steps “Writing to Describe” rubric was modified to reflect the emergent writing abilities of young learners (see Appendix A). Each print-based writing sample was coded for conventions along a four point scale (see Appendix B), and coded for language, description of information, and vocabulary on a three point scale (see Appendix A).

The digital writing samples were coded in a similar way; however, minor modifications to the coding system were required because the written text on the digital writing samples was minimal. In general, the digital writing samples consisted of a short single sentence to describe a detailed picture. Rather than solely examining the text, the graphic illustration was taken into account. When coding for the feature “description of information”, evidence of student understanding about a specific animal apparent within their illustration was considered. In Figure 1, for instance, although Luke was only able to write a short sentence about his picture,



he is able to graphically demonstrate his knowledge about toucans. Luke is aware that these birds have a colourful beak, a black body, and blue feet. To code this sample based exclusively on the text would not be an accurate measure of the student's understanding of the content. Because of this, when coding for "description of information" in the digital samples, I examined both the text and illustrations that the subjects produced.



**Figure 1. Digital writing and drawing about toucans by Luke.**

Corrected text: Toucans eat mangoes.

The notes taken from student conferences were transcribed, examined, and recurring themes arising from the responses were highlighted and colour-coded (see Appendix C.)

## Findings

Upon analysis and closer examination of the data sources, interesting and unexpected themes and patterns were revealed. When aspects of expository writing were examined between

print-based and digital writing samples, unanticipated differences emerged. The findings from the student responses uncovered fascinating insights and perspectives from the children's point of view.

### Writing samples

After coding the print-based and digital writing samples, the frequency of each level on the scales for all the samples was recorded. Students demonstrating ability at the beginning stage have a minimal awareness and usage of the basic organizational features of expository texts, such as language, description, and vocabulary. Children at the developing stage have an increasing understanding of textual features, but use them inconsistently. At the consolidating stage, students have a greater grasp of textual features and are able to use them consistently in their writing. Appendices B and C outline these scales in greater detail. Figures 2 through 5 summarize the findings for each writing feature.

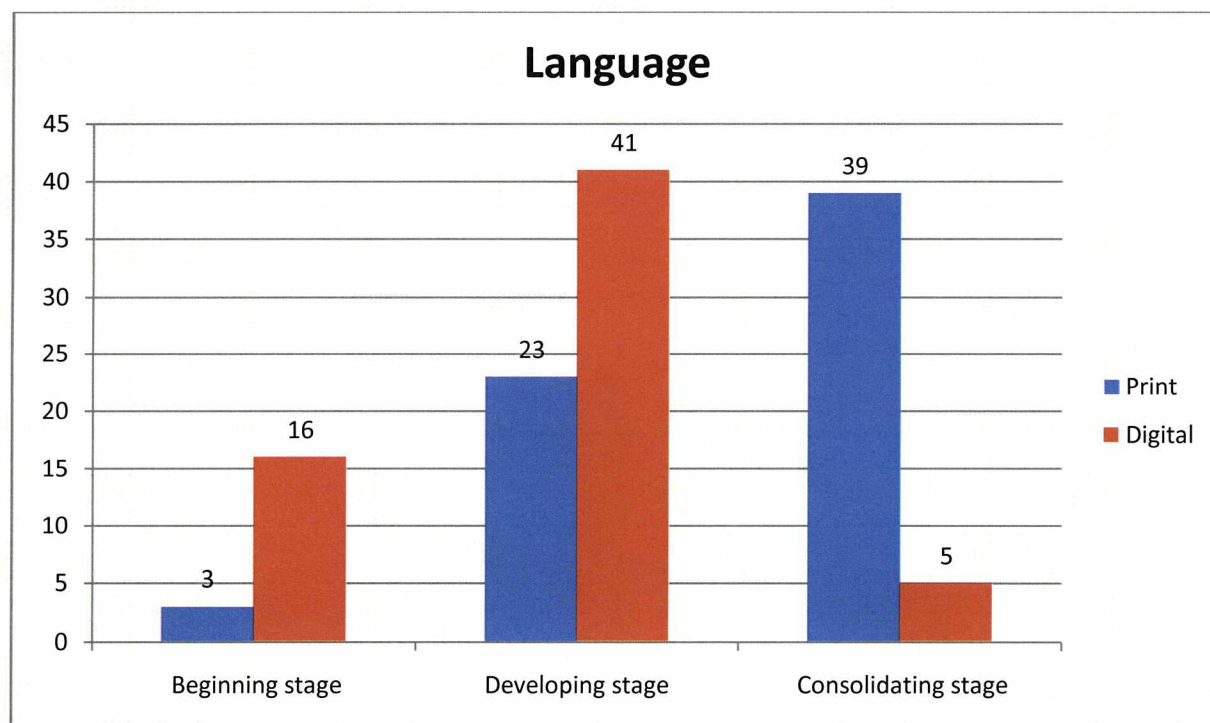


Figure 2. Summary of findings comparing print-based and digital writing samples for language features.

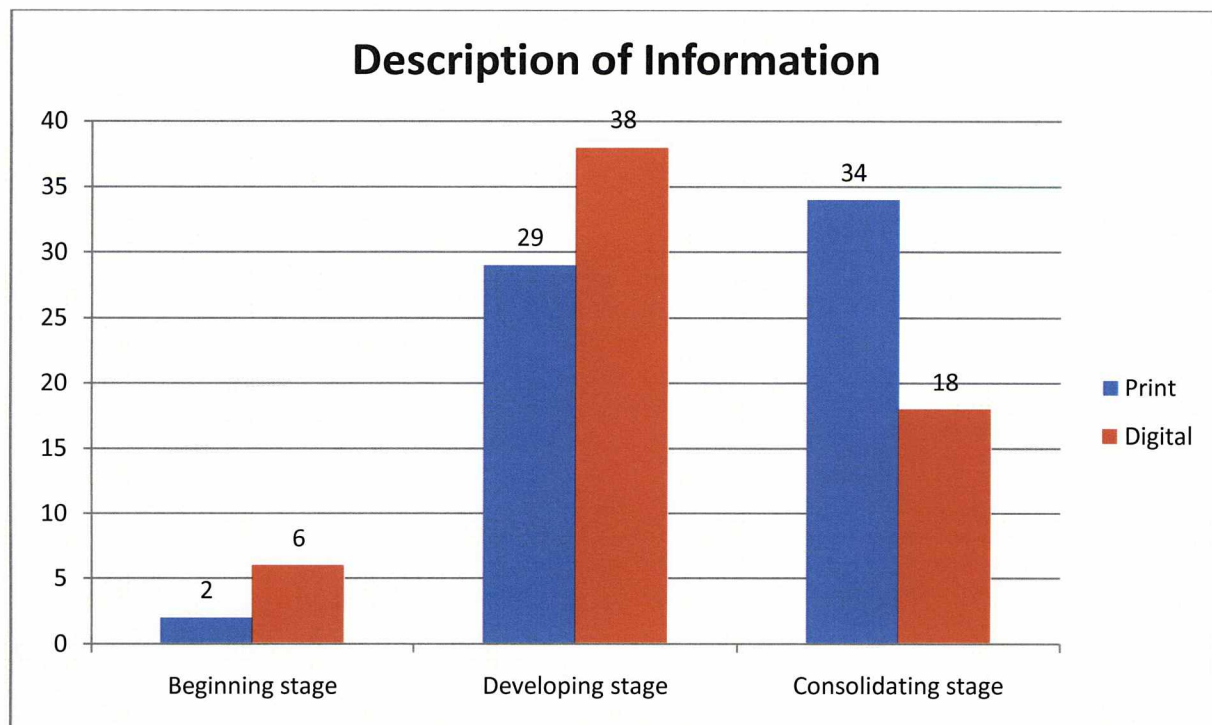


Figure 3. Summary of findings comparing print-based and digital writing samples for description of information.

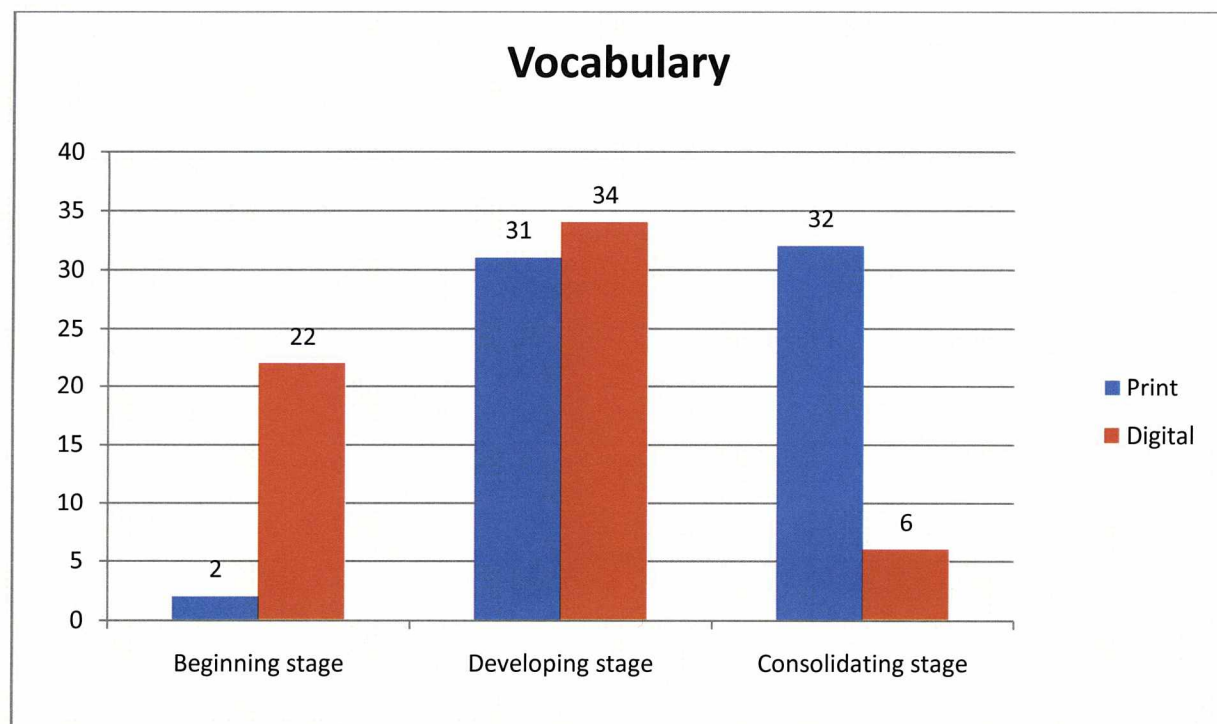
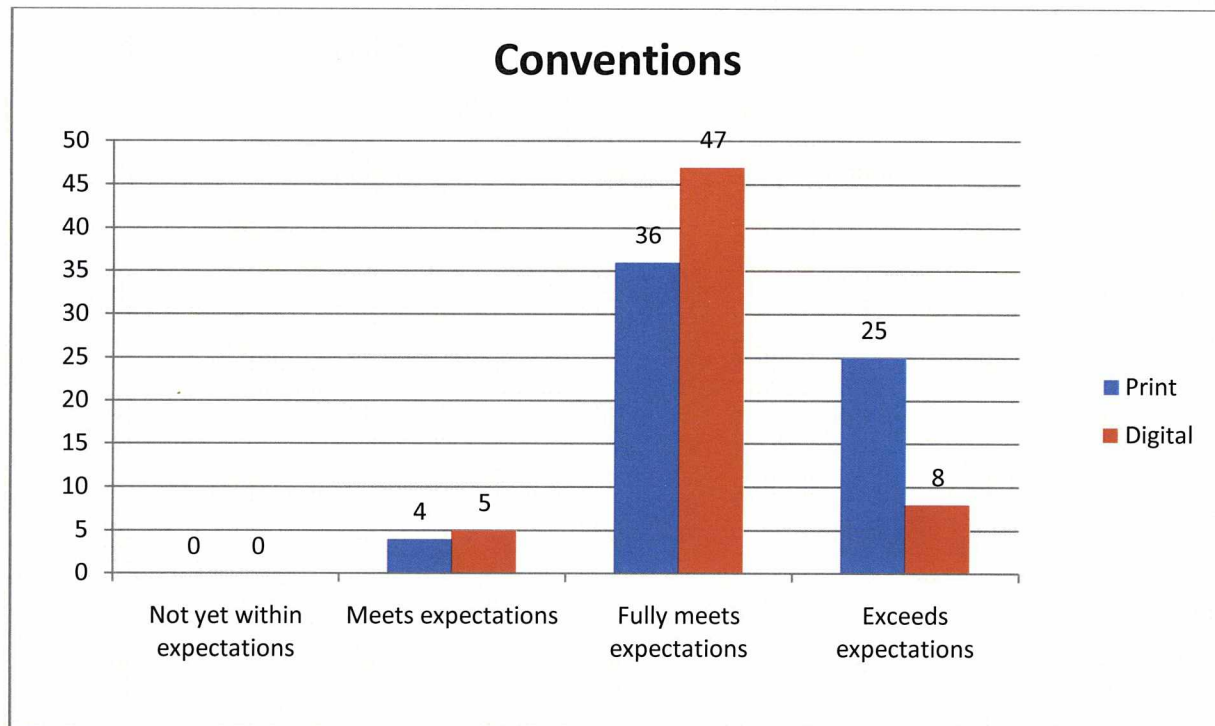


Figure 4. Summary of findings comparing print-based and digital writing samples for vocabulary.



**Figure 5. Summary of findings comparing print-based and digital writing samples for conventions.**

A noteworthy trend that emerged was that print-based writing samples had significantly higher occurrences at the highest end of the scale for each feature than the digital samples. For instance, when looking at the conventions of writing, 25 print-based writing samples demonstrated that the students exceeded age-appropriate expectations, whereas, only eight digital samples showed that students mastered the conventions of writing at a grade one level. This trend is evident in the use of vocabulary, language, and description of information. Yet at the opposite end of the scale the reverse was true. More digitally mediated writing samples fell within the “beginning stage” when compared to the print-based samples. It is worth mentioning that the digital samples contained more occurrences of students writing at the “developing stage” and “meets expectations” or “fully meets expectations” than the print-based samples.

In comparing the print-based writing samples with the digital writing samples, an interesting difference emerged. The print-based writing samples were significantly longer than the digitally-mediated ones. Many students wrote several pages when given traditional writing



tools, while when using computers, the students generally wrote a single sentence. Upon further analysis, I determined that, on average, the student wrote 25 words per writing sample when using conventional writing media. However, when the students wrote using a computer, they only wrote, on average, 7 words per sample. Table 1 summarizes this unexpected finding.

**Table 1**

**Average number of words written by students using print-based and digitally-mediated writing tools**

Print-based writing samples	Digital writing samples
25.4	7.0

### **Student conferences**

Once the data collected during the student conferences were coded, I observed that the comments fell into several categories. These included comments regarding a positive or negative response to the digital writing experience and opinions concerning the ease or difficulty in producing the digital samples. As well, these young students often made statements referring to either drawing or writing on the computer and learning subject-specific material through the use of technology. While most remarks were about the school-based experiences, some students made connections to their home-based computer practices. Figure 6 summarizes the categories and themes that surfaced during the student conferences.

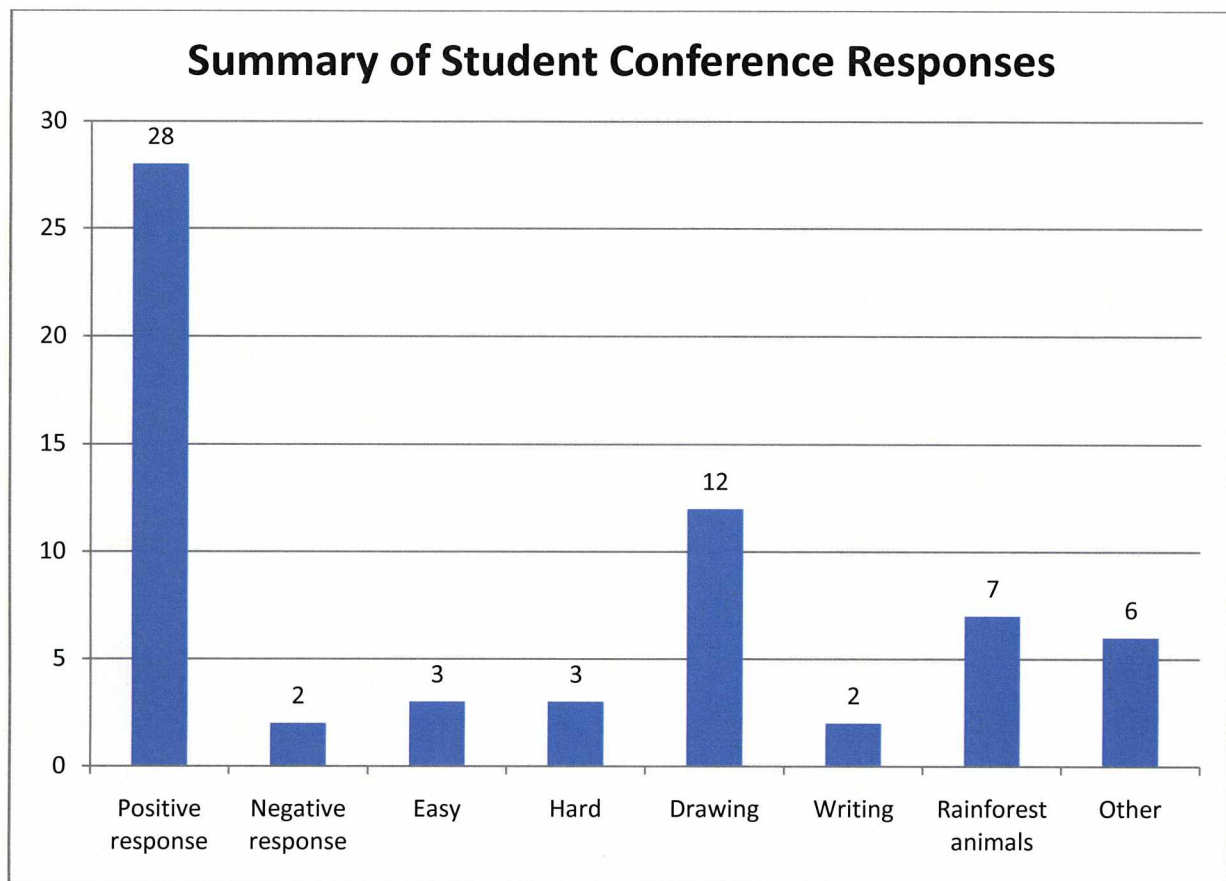


Figure 6. Summary of student conference responses as coded in Appendix C.

An overwhelming majority of the students that participated in the study made positive comments about the digital writing experience. Statements about digital writing being an enjoyable experience made up 28 out of 63 (or 44%) of the comments. Only two negative remarks (3%) were made about digital writing. Ellie stated that she didn't like using computers, while Jefferson said that he was "nervous the first time", but as he practiced and gained confidence, "it got better and then it was great."

An equal number of comments about the level of difficulty required in the task of producing digital text were made. Reasons given for students saying that the task was difficult were "it was hard to use the mouse" (Ellie and Tyler) or "it was hard to sound out the words" (Kerri).

Another notable theme that emerged from the data was the frequency of comments regarding drawing on the computer. Many students stated that they looked forward to being able to draw pictures using the software. Yet few students mentioned creating text. Only three comments were made regarding using computers to create text, these included “I like writing” (Jordan), “I can write and draw and use a keyboard” (Oliver), and “it was hard to figure out how to spell words” (Kerri).

While most comments from the students were about creating and producing meaningful text and illustrations, several statements were about using technology for instruction and delivering content. These remarks included students’ interest in the images, and video and audio clips of the rainforest animals.

Many comments did not fall neatly into the above described categories. These included insights into the features that technology enables, such as “I get to start over if I made a mistake” (Kailey) or “I liked seeing the pictures and sounds of the animals” (Oliver). One student made a connection to his home-based technology practices in his statement that he liked “to draw on the computer because I don’t get to do it at home. I play [computer] games at home” (Sam). These comments from the young subjects offer insight into their perspective on the use of technology in writing.

In summary, the findings that emerged from this study reveal that more students demonstrated writing at the consolidating stage, or exceeding expectations, for expository writing features when they used conventional, print-based media. Conversely, more students were writing at a beginning stage, or not yet meeting expectations, when they used digitally-media writing tools. Students wrote more than three times as many words when they wrote on paper than when they wrote on a computer screen. Yet, a considerable number of student

responses indicated a positive attitude and experience to writing with computers and an advantage when illustrating concepts.

### **Discussion**

This study yielded interesting and unexpected findings worthy of further examination. Initial interpretations of the data appear to both support and contradict existing literature in the area of computer-assisted writing among children.

Many studies (Burnett, 2009; Goldberg, Russell, & Cook, 2003; Yost, 2003) suggest that motivation, interest, and engagement increased when students wrote using computers. The considerable number of comments that were made regarding a positive affect toward digital writing in this study is consistent with recent research. Notes from teacher observations during writing lessons indicate that students were engaged and on task during writing sessions in the computer room, supporting widely held views concerning technology and enhanced levels of motivation. As a result of high engagement and interest, many students produced creative and detailed images in their digital writing samples. Figure 7 illustrates Jordan's detailed image and written text demonstrates his understanding of sloths.



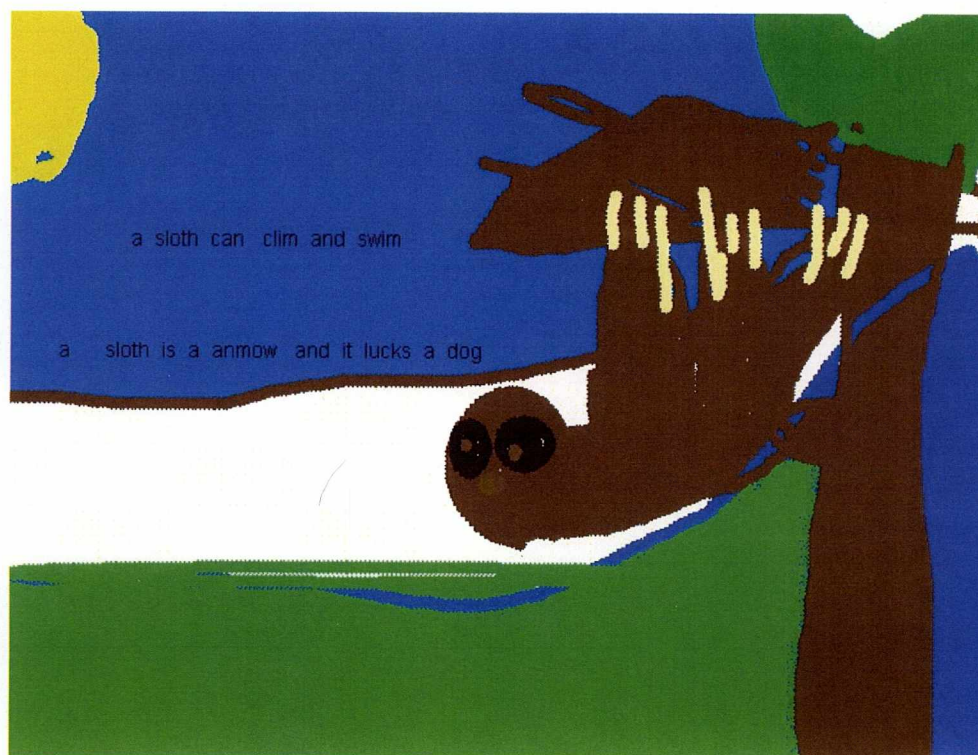


Figure 7. Print-based writing and drawing about sloths by Jordan.

Corrected text: A sloth can climb and swim. A sloth is an animal and it looks [like] a dog.

Goldberg et al. (2003) found that writing generated on a computer was longer in length than that produced on paper. Yet the findings from this study demonstrate the opposite. The students wrote, on average, three times as many words using conventional writing tools than using a computer. Several reasons may account for this discrepancy. First, because of school scheduling, students had limited time and access to the computers in the lab in order to complete the task. They were required to complete their drawing and digital writing within the allotted amount of time. However, with their print based writing, the children were given an unlimited amount of time to complete their writing. They were permitted to work on this task throughout the school day and submit it when they felt they were finished. The extended time resulted in the children producing longer texts.

Another factor contributing to minimal text production in digital writing may be the students' perceptions of the process of writing on a screen versus writing on paper. I observed that when writing using conventional tools, students would begin the task by writing words and sentences and generating an illustration once all the text was complete. Their primary objective is to produce text. On the other hand, when students were asked to write using a computer, they approached the assignment by drawing first, and then adding text. This preference for visually representing knowledge is reflected in the student conference responses, in that when the children were asked what they liked about using computers, more comments were made about drawing than writing. The manner in which students prioritize their actions suggests that young children's conceptual understanding of digital writing is primarily visual and graphic, rather than textual. The progression from graphic symbolic representation to conventional textual meaning-making in digital writing parallels widely held notions of writing development in young children (Labbo, 1996; Levin, 2003; Yost, 2003) using conventional tools.

Studies looking at young children's conceptual understanding of print suggest that some writing skills, such as using spaces between word and punctuation, were better demonstrated in children's digitally-mediated writing (Yost, 2003). However, the data that surface from this study indicate that more students were exceeding expectations in conventions through print samples over digital samples, in the area of conventions. It is typical for young children to use capital letters, spaces, and punctuation inconsistently in their early writing, regardless of the media they are using. Still, it is curious to observe students who use writing conventions appropriately in their print-based samples, and do not transfer that understanding to their digital writing. In his print-based sample, Jefferson begins sentences about bats with a capital letter (Figure 8), yet fails to do so in his digital sample (Figure 9). This example highlights a common observation noted across the samples.



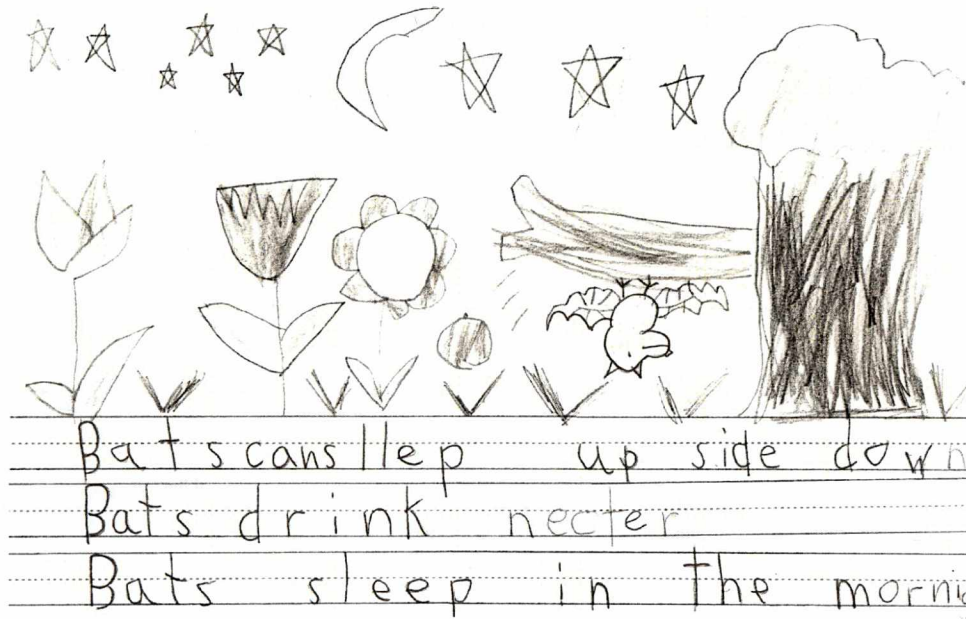


Figure 8. Print-based writing and drawing about bats by Jefferson.

Corrected text: Bats can sleep upside down. Bats drink nectar. Bats sleep in the morning.

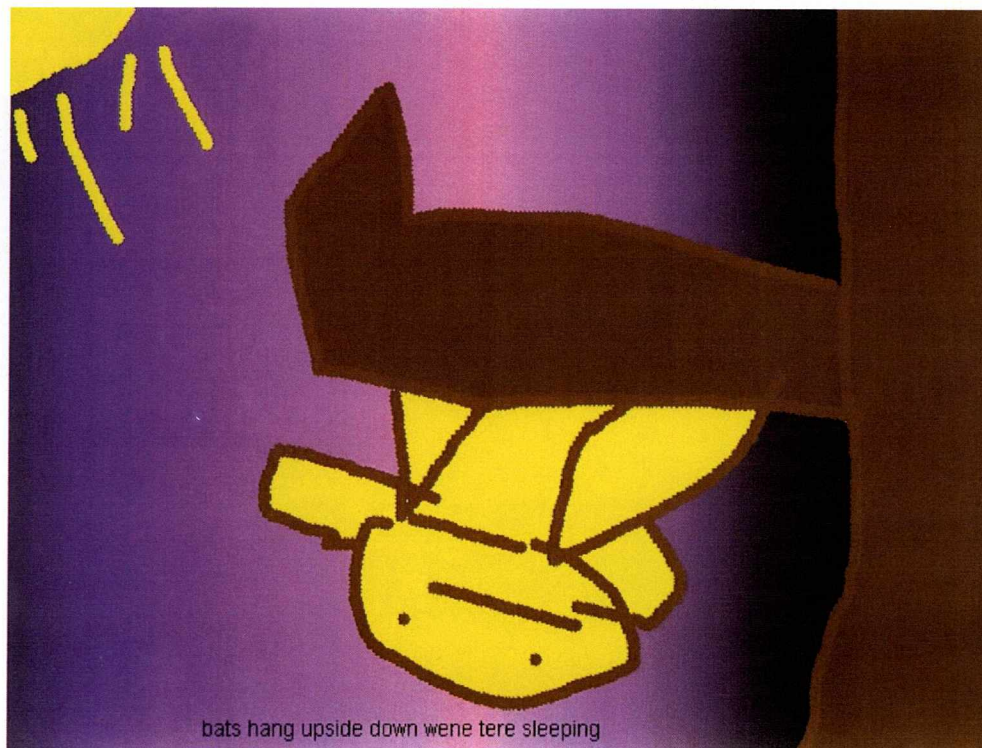


Figure 9. Digital writing and drawing about bats by Jefferson.

Corrected text: Bats hang upside down when they're sleeping.

A possible explanation for this observation is that young children are more accustomed to conventional forms of writing and many students are unfamiliar with using a keyboard to create text. Most children learn to form the alphabetic letters by using a pencil and for many children in the first grade, they have only recently learned to distinguish between and form capital and lowercase letters. Locating letters on a keyboard poses a new challenge. Manipulating a keyboard to produce capital letters requires further knowledge and using the shift key calls for additional fine-motor coordination. While a model of instruction that emphasizes parallel path of writing development may reduce the dissonance between traditional and digital means of creating text (Merchant, 2008), studies point out that children do not follow a predictable path in their writing development (Dyson, 2003), therefore lessening the effectiveness of this framework.

A key feature of expository writing is the use of objective language, rather than personal, subjective language. Young students develop their understanding and competence in using appropriate language in non-fiction writing. The findings of this study reveal that, although more digital writing samples fell within the developing stage in language use when compared to print-based samples, the reverse is true for students demonstrating ability at the consolidating stage. A significantly greater number of print-based writing samples demonstrate superior proficiency in using objective language when compared to digital samples. Several samples provide evidence of students' inconsistent use of objective language. Jordan begins his writing by using personal language, but makes the shifts to objective language (Figure 10).





Figure 10. Digital writing and drawing about tree frogs by Jordan.

Corrected text: My frog is a tree frog. A frog can climb and can jump.

In my examination of the digital writing samples, focusing on the use of objective language, I made an unanticipated observation. Over the course of the study, several students consistently wrote narrative pieces, rather than expository ones. In Figure 11, Ellie introduces herself as the speaker and proceeds to tell a story about a bat, although the following text is more descriptive in nature than narrative. Ellie has not yet grasped the notion of objective, impersonal language that is characteristic of expository writing. In a study conducted by Duke (2000), she remarked that the majority of texts encountered by first grade students are narrative. She reports that the availability of informational texts is often scarce in primary school classrooms. This observation may account for the children's use of subjective language. Because children have less experience reading and engaging with non-fiction texts, they are unfamiliar with the

objective language found in expository writing, and thus have limited ability to use this type of language in their own writing.

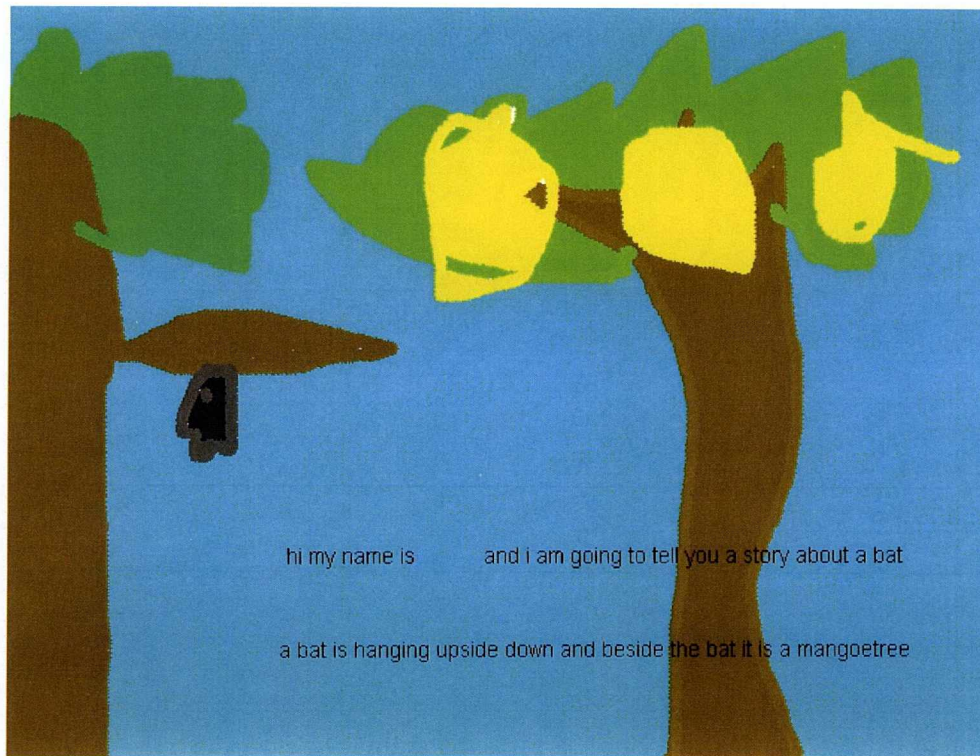


Figure 11. Digital writing and drawing about bats by Ellie.

Corrected text: Hi my name is [Ellie] and I am going to tell you a story about a bat. A bat is hanging upside down and beside the bat is a mango tree.

## Limitations

A number of factors influenced the outcome of the findings in this study. The most dominant constraints were time and access to the computers. Had the children had unlimited time and access to the computers, the digital writing samples may have included more text and many more students' writing may have fallen into the consolidating stage or exceeding expectations.

Another factor that played a role in the results is the children's developing understanding of the production of digital writing. The added effort in locating letters on the keyboard,



learning how to create spaces between words, and generating capital letters, may have hindered the children's production of digital writing samples.

A significant trend that is consistent among all four features of expository writing is that, collectively, the students performed better when using computers to write than using conventional tools at the beginning and developing stages (or meets and fully meets expectations for conventions). However, as students move along the continuum toward increasing ability, that data shows that print-based writing facilitated better performance. I would speculate that if the limitations present within this study were minimized, the results would demonstrate that digital tools can support writing development at the high end of the spectrum. Further research would be required to confirm this theory.

### **Implications**

The data gathered in this study have potential implications for educators as they consider the effects of technology on the writing development of young learners. As computers become an integral component in schools and classrooms, teachers are challenged to take into account the advantages and disadvantages that come with integrating digital writing in the curricula. While disadvantages include decreased amount of text, limited accuracy in written text, and less details within written descriptions, these need to be weighed against the significant advantages of technology. The advantages comprise of enhanced engagement, resulting in increased creativity. Technology allows young students to access features not available in conventional methods of meaning making. Digital writing permits students to explore and create meaning through choices in font, colour, and layout. Table 2 summarizes the advantages and disadvantages that come with the use of digital writing in young students.

**Table 2****Summary of advantages and disadvantages that accompany the use of digital writing with young children**

Advantages	Disadvantages
<ul style="list-style-type: none"><li>- Engagement</li><li>- Creativity</li><li>- Affordances, such as font, colour, and layout</li></ul>	<ul style="list-style-type: none"><li>- Amount of text</li><li>- Accuracy in written description</li><li>- Details of written description</li></ul>

The disadvantages listed here may be more a consequence of young children's limited competence in producing text on computer, than a conceptual understanding of writing or even their ability to write. As young children become more and more adept at locating letters on the keyboard and progress in overall writing development, these losses may be minimized and greater gains may be observed.

### **Future Research**

Digital writing allows students to access features conventional writing cannot. Visual images play a role in digital writing (Merchant, 2006) and as researchers and educators attempt to broaden the definition of literacy, new questions are arising. For example, what significance do font, colour, and layout have in digital meaning-making for young students (Matthewman & Triggs, 2004)? These factors are not taken into account in this study. As more research, based, for example, on Gunther Kress' work on semiotic theory, is conducted, examining this data through the lens of multimodality may reveal fascinating and insightful understandings of young children's writing development.



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**Software**

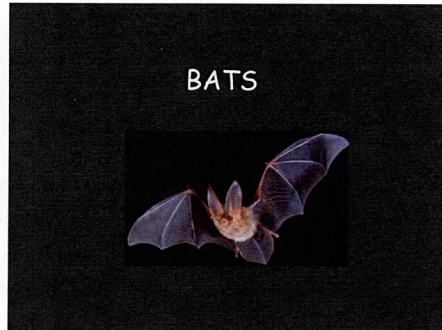
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*Powerpoint* by Microsoft

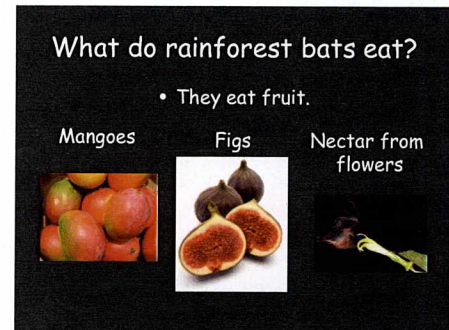
## Appendices

## Appendix A: Sample Powerpoint presentation about bats

Slide 1



Slide 2



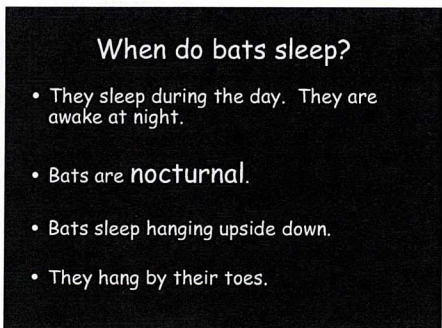
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Slide 4



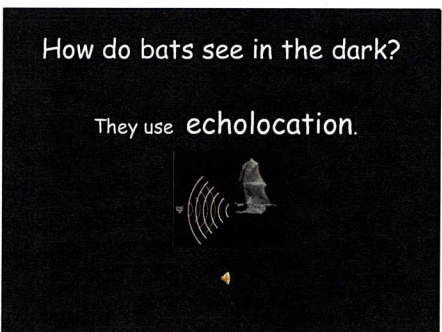
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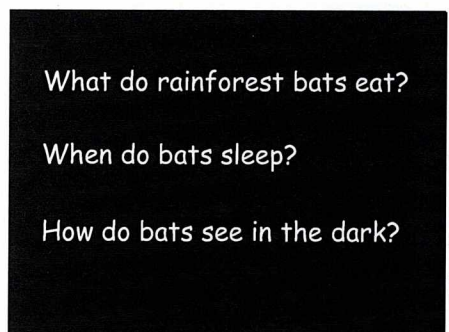
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Slide 7



Slide 8



**Appendix B: Coding System for Print-based Writing Samples****First Steps – Writing to Describe.**

Language	L1	• uses personal, subjective language
	L2	• beginning to use objective language
	L3	• maintains appropriate language throughout

Description of information	I1	• details that are not necessarily important or relevant • minimal information
	I2	• limited, general factual information
	I3	• detailed factual information

Vocabulary	V1	• simple vocabulary
	V2	• attempts to use subject-specific vocabulary
	V3	• uses subject-specific, technical vocabulary



**Appendix C: Coding System for Print-based Writing Samples****BC Performance Standards – Grade 1 “Writing from Experience”.**

Conventions	C1	<ul style="list-style-type: none"> <li>• strings of capital letters without spaces; single letters may represent words</li> <li>• may show correct initial consonant for an intended word</li> <li>• not yet be able to use sound-symbol relationships (phonics)</li> <li>• no punctuation</li> <li>• may be copied or dictated to another person</li> </ul>
	C2	<ul style="list-style-type: none"> <li>• tends to rely on capital letters; may include some small letters</li> <li>• some conventional spelling</li> <li>• many words spelled phonetically; may need frequent help in applying phonics</li> <li>• may experiment with punctuation; shows some sense of sentences when reading own writing aloud</li> <li>• parts are legible; other parts may be difficult to read</li> </ul>
	C3	<ul style="list-style-type: none"> <li>• includes both capitals and small letters (may be inconsistent)</li> <li>• many familiar words are spelled conventionally</li> <li>• new or unfamiliar words spelled phonetically; beginning to use phonics consistently</li> <li>• some punctuation marks (used inconsistently)</li> <li>• legible; there are spaces between most words</li> </ul>
	C4	<ul style="list-style-type: none"> <li>• includes both capitals and small letters</li> <li>• most familiar words are spelled conventionally</li> <li>• independently able to solve spelling problems, usually by applying phonics</li> <li>• generally written in sentences; may experiment with a variety of punctuation marks</li> <li>• legible; there are spaces between the words</li> </ul>

**Appendix D: Coding System for Student Conferences**

Question	Colour code	Student Response
“How did you feel about using computers to learn about the rainforest?”	Red	• Positive response
	Blue	• Negative response
	Green	• Comment about difficulty – Easy
	Yellow	• Comment about difficulty – Hard
“What did you like or not like about using computers?”	Orange	• Writing
	Purple	• Drawing
	Purple	• Learning about animals and rainforest
	Pink	• Other responses