SERVING ELEMENTARY STUDENTS' INSTRUCTIONAL NEEDS WITH VIDEO TUTORIALS

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Abstract

In grade 4-7 computer skills classes, screencasts were used to study how learner needs for assistance were served by video-tutorials in which learners could control the pacing and sequence of instruction. This study measured and compared the number of student requests for assistance during video-tutorial and teacher-led lessons, their performance on posttests following both methods of lesson delivery, and their attitudes and perceptions of their experiences of learning with video tutorials. When they were using video tutorials, controlling the pace and sequence of instruction in accordance with their own preferences, learners worked more independently and requested less support from the teacher or peers than they did during teacher-led lessons. Video-led groups outperformed teacher-led groups on posttests in this study. Student survey responses indicated that most students utilized the ability to pause and replay segments of the lesson; preferred video-led lessons over teacher-led lessons; and reported that video-led lessons made learning easier than it was during teacher-led lessons.

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Acknowledgements

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Chapter 1

Introduction

In this project I created video tutorials (screencasts) of computer skills lessons for grade 4 to 7 students. Screencasts are digital recordings of computer screen output. Screencasts are also referred to as video screen captures. Screencasts can record a teacher's computer screen output and audio explanations thereby capturing the lesson that the teacher provides using the computer. In grade 4 to 7 computer skills classes, screencasts were used to determine whether learner needs for assistance can be better served by video-tutorials that permit learners to control the pacing and sequence of instruction or by teacher-led lessons where instructions and demonstrations are provided for the entire class. Both teacher-led and video-supported lessons were supplemented by individualized help as needed. In order to determine if self-paced video-tutorials help to meet students' needs for assistance, this study measured and compared the number of student requests for assistance during video-tutorial and teacher-led lessons. Learners were also surveyed to determine: (a) whether they like or dislike using video-tutorial lessons, (b) whether video-tutorial lessons make learning easier or more difficult, (c) whether they believe that they required more or less assistance during video tutorials, and (d) whether or not they utilized the options of reviewing or pausing segments of the video tutorials. In addition, the survey concluded with three open-ended questions that asked students to report what they liked and disliked about using video-tutorial lessons and invited them to provide any additional comments.

Significance of the Project

In our school, as in many schools, student abilities and needs are becoming more diverse. At the same time, our education system is transitioning from a "sorting" model (where instruction was delivered to whole groups and students were graded on the degree to which they mastered the content) to a "learning" model where instruction and learning time may be varied in accordance with student needs to ensure appropriate levels of success for all learners. To facilitate learning and success for all students, it is necessary to find effective methods of meeting their individual needs for instruction and support. Video-tutorials and screencasting are utilized frequently in post-secondary and distance-learning courses. They provide advantages such as enabling asynchronous and non-linear paths of instructional delivery which permit the pacing and sequence of instruction to be controlled by the learners in order to suit their individual needs. It would be useful to know if video lessons can be effectively utilized to serve diverse learning needs at the elementary school level. I conducted an extensive search for research concerning the use of video tutorials for instruction of elementary school students. The search was unsuccessful. Research reports on the use of video tutorials for instruction of elementary school students were not found. Future research in this area could provide important information for elementary school educators.

With the proliferation of multi-media technologies such as digital tablets and other personal devices (laptops, cell phones, iPods, and mp3/mp4 players) that can present images, audio recordings, and video recordings, many new

possibilities are arising for instructional delivery and student learning. It is becoming a practical possibility to replay a teacher's lessons, explanations, or demonstrations and even to pause, rewind, and review specific segments as needed for greater understanding and deeper learning. Moreover, with recorded lessons, students who are absent or learning from a remote location are able to access and benefit from the lessons. The potential for recorded lessons to support the diverse needs of individual students simultaneously may help teachers improve the level of inclusive education they can provide for the students in their care. If video lessons enable many students to be replaying different aspects of the lesson simultaneously, each according to his or her individual needs, teachers and teacher aides can be freed up with more time to provide extended support to students who need it.

At the elementary school level, it is uncommon for teachers to use recordings of their lessons to facilitate and enhance learning. This study will provide some information about the effectiveness of supplementing instruction with video tutorials. If the study shows that video tutorials are useful for delivering instruction to elementary school students, then elementary school teachers may be encouraged to utilize this instructional technology in their own practice. Video lessons may become a tool that could help educators to provide increased amounts of inclusive education that improves success for their students.

Video lessons can be viewed with many of the current technologies ranging from small mp3/mp4 players and digital tablets up to computers attached to any size of display or projector. Aside from the learning and pedagogical

benefits, we may increase the interest and engagement of our students in learning by utilizing the technological tools that their generation likes to use.

In summary, this project is important because recorded video lessons are becoming more accessible and easier for teachers to create themselves. It is important to understand how video instruction may be effectively utilized to support learning and to enhance instruction with elementary school age learners. Video lessons have the potential of helping educators to meet the individual needs of diverse learners and provide all learners with control over the pacing of the instruction to suit their individual needs. An additional benefit may be the utilization of technologies that are familiar and preferred by the current generation.

Background of the Project

For part of my teaching assignment, I teach computer skills to students in grades 4 through 7. The development of computer skills is integrated with content area assignments that supplement curricular goals in language arts, social studies, science, and mathematics. Students are keen to use computers for learning tasks but they may encounter problems in learning and mastering the technical skills required to complete their assignments successfully. As a teacher of computer skills, I encounter various challenges in facilitating the progress of students through these lessons in an efficient manner that provides appropriate pacing of learning and instruction for all learners.

First, lessons can be complex in that students may be working to master both the content and the technical computer skills simultaneously. The students

we teach present a wide range and diversity of knowledge and abilities from many years below grade-level to skills well beyond grade-level. The technical computer skills in the assignments often require multiple steps and tasks that present a challenge to the teacher trying to lead students with diverse needs as a group. As a result, students require variations in pacing, repeated demonstrations, and different degrees of guided practice to gain proficiency and complete learning tasks. Moreover, there are great variations in attention, concentration, understanding, and retention of instructions. For these reasons, it is challenging in this context to keep the whole class progressing through the lesson. Typically, some students are waiting for feedback or further instructions before they can proceed while other students are "stuck" and waiting for help to complete the tasks on which they are working. In order to keep students with varied levels of ability progressing through the assignments, I find that I inevitably need to provide instruction in turn to numerous different subgroups within the class. While I am demonstrating to one group, the progress of others may be limited. I find that as the lesson progresses, the students in subgroups become even more widely dispersed along the continuum toward task completion with increasing numbers of students needing individualized assistance. As this occurs, I am less able to meet all their needs in a timely manner and larger numbers of students are held back while waiting for assistance before they can continue. I often wish I could be in multiple places simultaneously so that I could help many students with differing needs at once. Naturally, this has inspired me to explore various strategies for delivering lessons and managing student

learning in order to accommodate better their diverse needs and improve the efficiency of the lesson.

Prior to the current study, I have been employing various strategies to address diverse needs for support and improve student success. To facilitate independence, I have provided detailed step-by-step instructions for students. These have been projected on a classroom screen, printed as a handout, or made available as a word processing file that students could open on their computer screens and refer to while working on their assignments. This instruction supplement enables some learners to become increasingly independent. However, I found that others did not like to use the detailed instructions because the instructions lacked visuals and many students that I teach have decoding and comprehension difficulties. I also find it time-consuming to prepare such detailed instructions. Some procedures that are more effectively demonstrated than described are difficult to prepare.

A second strategy that I employ to keep more students progressing through lessons is to teach to subgroups. I have approached subgroups in two different ways: (1) naturally occurring groups and (2) pre-established groups. As students proceed through their assigned computer skills activities, they naturally encounter differing challenges and progress at different rates, thereby separating themselves into natural subgroups. As needs arise, I call students at a specific stage, or with a specific need, to attend to the projected image on my screen as I demonstrate or discuss what they need to know in order to continue. Subgroups in this case are always fluid and changing based on the students' progress and

needs. It can sometimes be a challenge to strike a balance between meeting individual needs and various subgroup needs when this is combined with the need to keep all the students progressing efficiently through the assignments. When needs are diverse, productivity declines as students wait their turn for the assistance they require. Teaching subgroups in turn can be a useful strategy if the needs of individuals and groups do not become too great.

For complex lessons, I have used pre-established subgroups and staggered the instruction for each group. For example, while one group is receiving instruction the other groups are working on independent activities that do not require teacher support; such as, keyboarding, math drills, or vocabulary practice. This works well by reducing the number of students that require assistance at a given time, thereby enabling better support to those who need it. Disadvantages of this approach are that it requires repeating the lesson in turn for each group; it takes longer to complete the lesson cycle for all groups; and it can complicate tracking, managing, and synchronizing the progress of the different groups.

In order to enable more students to receive individual help as they need it, I sometimes encourage students who are proficient in the skill to assist their peers. This has often been helpful in reinforcing mastery of computer skills and is most effective with older students. However, with younger students there are great variations in helpfulness. Some are more able and willing to help than are others, and some have the tendency to rescue their peers by doing the work or thinking for them rather than 'teaching' them to do it.

Another strategy I have used in place of, or as a supplement to, written and oral instructions are screenshots of activities on the screen. These are most helpful when it is more efficient to show visually rich information than to describe it in words. Depending on the activity, a series of screenshots can be time-consuming to create and annotate prior to each lesson. Also, because screenshots are static graphic captures of the screen, they are not very helpful to portray actions and procedures that involve motion.

In summary, to improve success for all learners in computer skills classes, I provide individual assistance, teach to subgroups based on instructional needs, and provide supports such as detailed step-by-step instruction, peer assistance, and annotated screenshots to facilitate understanding. Although each of these strategies is helpful to some degree they do not adequately address the needs of individual students to work through tasks at a pace that is comfortable for them and still get support when they need it.

Occasionally, in preparing lessons for substitute teachers to deliver, I have created screen-recordings of my demonstrations accompanied by audio narration rather than writing many pages of detailed instructions. These recordings have enabled lessons to proceed even though I was not present. The students have been able to listen to my instructions and view the demonstrations that I would have given if I had been there leading the lesson. The substitute teacher did not have to be proficient in the computer skills being explained because the skills were explained and demonstrated fully for students on the video. This method of providing instruction led me to thinking about the potential of using screen-

recordings within my regular classes to clone my lessons virtually so that students could view them on their own and not need to wait for me to get to them to repeat a procedure or clarify something that they did not catch in the initial instructions. As a result I became interested in recording video lessons or screencasts of my lessons to help my students. I reasoned that the ability to pause my instructions or repeat them as necessary might improve student understanding and would reduce the amount of individualized assistance they would need from the teacher.

CHAPTER 2

Literature Review

I have searched the relevant literature for information about screencasting, podcasting, lecture capture, and video tutorials to learn about some of the benefits and drawbacks of utilizing video tutorials for supporting students' learning needs. Information about screencasts is becoming more prevalent as institutions are now distributing learning via the Internet. Much of the literature that one finds on screencasting is on the Internet in the form of blogs, electronic magazines, or journal articles that extol the potential of these technologies but fail to provide research-based evidence to support their claims. Scholarly research reports about the use of video tutorials or screencasts are not yet very prevalent. As the use of educational technologies increases, we can expect that in coming years scholarly studies on the benefits and limitations of these new forms of instructional delivery will increase. Intuitively one can understand the potential of screencasting but it will be important to determine that this medium of instructional delivery is actually as beneficial as proponents claim. Most of the relevant literature that I will discuss focuses on the use of screencasts/video tutorials for distance learning, post-secondary and adult training. I was unable to locate research on the use of screencasting with younger, elementary school students. Nevertheless, in examining the principles that apply to the use of video tutorials with older learners, we can make some inferences about their application with elementary students.

The literature uses terms such as screencasts, podcasts, lecture capture, and video tutorials interchangeably to refer to recorded lessons containing both video and audio components that can be accessed on the computer. Below I will outline some of the potential benefits of screencasting and then discuss what could be found in the research, particularly as it is relevant to the question of providing learners with control of the pacing and path of instruction.

Flexible Learning Time

In contrast to traditional teacher-led delivery of instruction, the use of video tutorials enables lessons and demonstrations to be archived so that they can be used anywhere and anytime. Moreover they can be accessed by more learners than merely those in attendance during a live lesson delivered by the teacher. For instance, Sal Khan has established Khan Academy, a website, which includes a free online archive of over 1800 video tutorials that are viewed by over a million users per month (Barseghian, 2010). Khan Academy video tutorials have enabled one instructor to instruct a global audience of learners to master concepts in a variety of subject areas. This has been particularly valuable to students throughout the world in places where there is no other access to a suitable tutor or teacher.

Screencasting and video instruction support the "flipped classroom" approach to instruction. Martin (2011) describes the flipped classroom or reverse instruction approach in one of his posts.

> "Flip your instruction so that students watch and listen to your lectures...for homework, and then use your precious class-time for what previously, often, was done in homework: tackling difficult problems, working in groups, researching, collaborating, crafting, and creating.

> Classrooms become laboratories or studios, and yet content delivery is preserved." (Martin, 2011, para. 8)

Fulton (2012) reports that teachers claim numerous benefits of a flipped classroom approach. It preserves valuable class time. It can save time presenting instructional content as students listen to the teacher's lectures at their own pace without distractions and interruptions that may occur in class. In a flipped classroom the teacher is working with the students while they are doing their work. This prevents situations where they may be stuck at home without support and provides teachers with greater insights into how each student is learning. Video instruction accessible from home can also facilitate parental involvement by providing parents a way to see what the students are learning (Fulton, 2012). Video instruction provides teachers and learners with greater flexibility with regard to the time that instruction is delivered to the learners.

Student Preferences

In discussing studies of the effective use of lecture capture technology and the delivery of lectures as audio and video podcasts, Zhu and Bergom (2010) note that "students report that they appreciate the flexibility of accessing podcasts anywhere and anytime" (p. 2). Survey results indicate that the majority of undergraduate students prefer classes that offer captured lecture podcasts over those that do not. Students indicated that flexibility, convenience, and positive impacts on learning such as improved retention and test scores were benefits of using recorded lectures (Veeramani & Bradley, 2008).

Cooper (2001) compared online and traditional computer applications classes and found that "over 80% of the students stated that online classes

enabled them to better manage work and school, and they liked being able to learn at a self-directed pace" (p. 52). Those positive attitudes of students towards video tutorial/lectures represent general attitudes of adult learners. Studies of younger students are needed to determine if elementary school age children hold similar attitudes towards video tutorial learning and being able to learn at a self-directed pace.

Learner Control

In teacher-led lessons, the path, sequence, and pacing of the lessons are generally controlled by the instructor in accordance with the overall needs of the group. If the pace of instruction is too fast or a student needs more time to review a concept, it may not always be practical for the instructor to slow down, pause, or review concepts to accommodate those individual needs. Some of the research on the effectiveness of video tutorials focuses on the effects of providing learners with control over the instructional delivery. Williams (1996) defines learner control as 'instructional designs where learners make their own decisions concerning the aspects of the path, flow, or events of instruction' (p. 957). Milheim and Martin (1991) report that the video tutorial is a useful medium of instructional delivery because it can be designed to provide learners with varied degrees of control over the content, sequence, and pacing of lessons. Oud (2009) reports that screencasts are useful because students can start, stop, pause, fast forward, skip, or review segments of the lesson in accordance with their needs or preferences. "With videos, learners can watch on their own time, and pause and repeat information until they absorb the subject matter" (Khan,

2010). Learning may be improved when learners can adjust the pace of instruction to suit their individual needs.

Studies show that multimedia lessons are more effective when learners are able to control the pace of the lessons (Betrancourt, 2005). Control over the pacing of animated sequences, pausing and continuing as needed, helps the learner to have time to process information according to their own needs and helps to prevent perceptual and conceptual overload (Mayer & Chandler, 2001). Kruse (2002) has reported that self-pacing in e-learning contexts reduces stress and increases student satisfaction. Also, students at the University of Michigan have reported that screencasts are helpful for clarifying misunderstandings (Pinder-Grover, Green, & Millunchick, 2011). Furthermore, students who viewed video lectures tended to rewind the video to repeat sections they were having difficulty understanding (Dey, Burn, & Gerdes, 2009).

Thomerson (2006) studied differences between computer assisted instruction (CAI) video lesson formats that students view individually and traditional teacher-led on-screen lessons (e.g. projected with an LCD projector) done together as a class. Students showed a slight preference for video lesson formats over traditional class lessons. Although traditional lesson delivery was the less popular format, Thomerson reports that most students did not want 100 percent CAI video lessons either. Instead, students preferred a combination. In reporting respondents' preferences for CAI video lessons, the ability to review work (87%), work at one's own pace (89%), and pause instruction (85%) were highly valued aspects of CAI video lessons. Forty-three percent identified the

lack of live instruction as a disadvantage of CAI video lessons. Fifty-nine percent of respondents considered live instruction to be an advantage of traditional instruction and 80% indicated that the ability to ask questions was also advantageous. As for the disadvantages of traditional instruction compared to CAI video lessons, 57% considered the need to stay in "lock step" with the group was disadvantageous, 74% felt that the traditional approach was more time consuming, and 54% considered the inability to pause to take notes was also a disadvantage.

Drawing from his experience at Khan Academy, Khan (2010) suggests that video lessons are helpful in that they enable individual students to be able to focus on exactly what they need to know without feeling embarrassed about their need to fill in gaps in understanding. He suggests that in a traditional teacher-led lesson the "majority of students are too self-conscious or considerate of their peer's time to raise their hands." He goes on to state that many students are reluctant to derail the instructor's pacing to ask a question that may be relevant only to them alone or to a small minority of the class. Khan points out that utilizing video lessons in the classroom actually frees the professor to engage more effectively in problem-solving interactions in the classroom.

Achievement

To this point we have mostly considered information in the literature about video tutorials from a user experience and learner perspective. Next we will examine the effectiveness of video tutorials from the perspective of learning outcomes. It is difficult to find conclusive evidence to determine whether video lessons are generally effective or ineffective in facilitating learning. The research spans the spectrum from less effective, to neither more nor less effective, to more effective than traditional instruction. Video tutorials are a relatively new method of instructional delivery so it is an area that requires more study. Moreover, research to date has varied widely in focus and context which makes it difficult to make inferences or generalizations that apply to video instruction in the classroom setting with grade 4 to 7 students.

Oud (2009) points out that while media tutorials such as screencasts have potential for being effective tools for delivering instruction; the use of them does not guarantee success. As an example, she refers to research by Rice et al. (2005) that found no relation between the technology or tool used and success at teaching or learning (p.165). In a study of information literacy instruction, Anderson and May (2010) found that face-to-face, blended, and online learning instructional formats show no significant differences in retention of information literacy skills among learners. This would support the notion that, if effective instructional strategies are implemented, students can be equally successful in traditional or technology-mediated contexts.

Learner Control and Cognitive Load

To understand better how to realize the benefits of video tutorial instruction, researchers have examined the combined effects of learner control and cognitive load. Learner control theory suggests that students achieve better performance because of higher degrees of learner control over the path and pace of learning (Chou & Liu, 2005).

Prior to using multimedia forms of lesson presentation, it is important to ask whether it is needed. Betrancourt (2005) reports that:

> Multimedia, screencasts, and other types of animated media put high demands on short-term memory, since a lot of information (text, graphics, audio, motion) needs to be processed simultaneously. This means that it can be difficult for people to process information effectively from multimedia (Oud, 2009, p.165).

According to cognitive load theory, short term or working memory has a limited capacity for handling information at one time (Nguyen & Clark, 2005). For example, Clark and Lyons (2004) have found that at times static labeled visuals can be as effective as or more effective than screencasts with motion because sometimes static visuals can place fewer demands on a learner's working memory. This is an important consideration for anyone utilizing video tutorials.

What can be done if lessons are too information-rich for learners to absorb at once? One solution that is easily accommodated with video tutorials is to segment the information. Research by Mayer and Chandler (2001) has shown that learners can be successful if cognitive load is managed by segmenting the learning into meaningful chunks or by enabling individual learners to have control

so they can view segments as needed by being able to pause and play segments in accordance with their needs.

Hasler, Kersten, and Sweller (2007) studied the effect of learner-controlled pacing on cognitive load and performance when using instructional animations. It was found that learner-paced groups performed higher on post-tests and with a relatively lower cognitive load than did system-paced groups (p.713). Based on their research, Hasler et al., conclude: "Learner control, either in the form of pre-defined segments or by allowing the learners to pause the animation at any time, should be integrated in educational animation in order to improve instructional efficiency" (p.725). Moreno (2007), citing Kettanurak et al. (2001), states that "evidence suggests that novice learners do not seem to monitor the control of animations." Thus, for younger learners it may be helpful to establish predetermined segments for video lessons so that students can use their own discretion to pause/segment instruction as needed and if they do not do so, then the instruction will be presented in natural segments predetermined by the teacher for effective learning.

Lusk et al., (2008) examined the effects of working memory capacity (WMC) and segmentation in multimedia learning environments. They found that individuals with lower working memory capacity were at a disadvantage in some multimedia environments. What is interesting to note about their research is that "results also indicate that using segmentation benefits low WMC individuals to the point where low WMC and high WMC individuals perform equally in multimedia instructional environments that use segmentation" (p. 649). This is

an important finding – that segmentation enables low WMC learners to be able to manage their cognitive load in a way that enables them to be as successful as learners with higher WMC. Thus, well-implemented video tutorials can be important tools in providing inclusive instruction that ensures success for all learners.

The advantages of learner control of instructional pace depend upon the learners making choices that benefit their learning. It is possible that students may consciously choose to skip or gloss over some sections to their detriment. Other students may overestimate their understanding or proficiency with the content and not devote enough concentration to particular sections. In reference to research by previous investigators, Chou and Liu (2005) conclude that "since individuals differ in their ability to make appropriate learning and instructing decisions, some learners may view less material and skip important instructional components because of the overestimation of their ability" (p. 66). Thus, learner choices can affect the effectiveness of learning. Chou and Liu (2005) found that:

> ...students learning basic IT skills in TVLEs [technology-mediated virtual learning environments] have better learning effectiveness than their counterparts in traditional classrooms. [...] Because TVLEs provide a high level of learner control, coupled with aids for self-monitoring of progress, the students in the TVLEs outperform their counterparts in the traditional environment. Subjects in TVLEs reported higher levels of satisfaction than their counterparts in the traditional environment. (p. 74)

When learners monitor their progress and take control of the pacing of instruction they can improve their learning.

Kalyuga, Chandler, and Sweller (1999) present research showing that when using multimedia tutorials one must be aware that higher demands on

cognitive load may be caused by a split-attention effect. An example that splits attention would be when distracting events or text annotations appear on the screen while the student is watching the demonstration and listening to the audio instructions. While a student is watching actions on the screen, an audio narrative would be better than text annotations which might compete with the actions or audio narrative for learner attention. Helping the learner to focus on what is important is helpful. Within complex screen animations, it is important to avoid a split-attention effect which can easily happen when redundant information is presented in a way that splits the viewer's attention and increases his or her cognitive load (Kalyuga et al., 1999). Ayres and Paas (2007) report that extraneous cognitive load can be reduced for learners when appropriate annotations, visual cues, or verbal cues are used to focus learner attention on salient aspects within complex animations (p. 697). Software, such as Camtasia Studio and Abobe Captivate, allow the editing of video tutorials after recording to insert such cues that help to focus attention.

The research shows that students prefer video tutorial lessons when there is no need to ask questions or interact with peers. Video tutorials can facilitate learning by allowing learners to manage and reduce cognitive load and demands on working memory. Video tutorials increase student satisfaction and self-efficacy if the students can control the pacing and view segments in a non-linear manner if needed to clarify understanding and achieve mastery. Given the lack of research on the use of video tutorials in regular classrooms at the elementary

school level, it is important to study the benefits and limitations of using screencasts with younger learners.

Chapter 3

Method

Inquiry Question

Will the use of pre-recorded video lessons effectively satisfy the needs of individual students for differentiated pacing and instructional support in grade 4-7 computer skills classes?

Procedures

In preparation for this study, computer skills lessons were recorded using Camtasia Studio software. Videos included all the on-screen demonstrations of teacher-led sessions along with accompanying audio commentary. Lessons were created in segments by specific task or topic so that students were easily able to select specific segments from a playlist to view or review them as necessary. Prior to introducing the first lesson, students were shown how to select video segments for viewing; how to stop, pause, skip forward or back, resume, or replay portions if they would like to control the segments they view. Teacher-led and video-tutorial lessons were delivered to classes in a rotation that ensured that all classes experienced the same number of teacher-led and video-led lessons. Data were gathered to determine the effectiveness of using video tutorials to support students' needs for pacing and support.

Participants

Participants in this project included students from a grade 4/5 class, and two grade 6/7 classes at William Konkin Elementary School in Burns Lake, B.C. All students in these classes received the video-tutorial and teacher-led lessons that

were observed in this project. These lessons were part of the regular school program. Parental consent for the inclusion of student data in the study was obtained by means of an information letter and consent form that were sent to the parent/s of each student (see Appendix A and Appendix B, respectively).

Delivery of Lessons

To assess the potential value of video lessons for meeting individual needs for instruction and pacing, students received computer-skills lessons presented by two different delivery methods:

- Delivery Method 1 The teacher delivered the lesson and controlled the pacing of instruction in accordance with the observed needs of the class. The teacher provided assistance to students as they requested help.

- Delivery Method 2 Lessons were delivered by video tutorials (pre-recorded by the teacher) in which each individual student was able to control the pacing of instruction to suit his/her own individual needs. The teacher provided assistance to students as they requested help.

Data Collection

Requests for teacher, educational assistant (EA), and peer support were monitored and tallied. Inevitably students encountered technical problems with some of the computers. Requests for support with technical issues such as hardware, software, or connectivity issues were not included in the data. Only requests for support related to the lessons were included. Data collection included:

- The ratio of help requests per students in regular teacher-led lessons.
- The ratio of help requests per students in video-supported lessons.
- The duration of teacher assistance provided.
- A checklist to ensure that all tasks in the lessons were completed.

- A record of the students' pre-test and post-test results on the skills taught (Appendix C).
- An anonymous survey (Appendix D) on which the students indicated:
    - whether or not video-supported lessons made tasks/learning easier.
    - whether they required more or less teacher/teacher aid/peer help using video-lessons.
    - whether or not they liked using video-tutorials.
    - whether or not they took advantage of the ability to review or pause segments of the video.
    - what they liked about video tutorials.
    - what they did not like about video tutorials.
    - any other comments they wished to make.

Data Analysis

For the purposes of this study, the identities of the classes and the students in each class were protected by removing all their identifying names and replacing them with identification numbers. The data were entered into spreadsheets to facilitate analysis and enable the presentation of the data in tables and charts for this final report. The data were analyzed to determine the impact of video-tutorials in comparison to teacher-led lessons to answer the following questions:

- Do video tutorials decrease students' needs for support during computer skills lessons?
- What differences are there in the degree of teacher time and assistance required, and the achieved learning outcomes between video-tutorial and teacher-led lessons?

Student responses on a survey (Appendix D) were analyzed to determine if there are patterns in the responses of answers to questions such as:

- Do students find it easier when they can control the pacing of instruction in the video tutorials compared to the teacher-led lessons?
- Do students like using video tutorials?
- Do students perceive that they are more independent and require less help when they are able to access the information via video-tutorials?

- What proportions of students felt that using video tutorials made learning easier?
- What proportions of students felt that using video tutorials made learning more difficult?
- What proportion of students used the option to pause the instruction to control the pacing of instruction?
- What proportion of students used the option to replay segments of the lesson?
- What did students list as aspects they liked about video-tutorials?
- What did students list as aspects they disliked about video-tutorials?
- What other thoughts or opinions have the students expressed regarding video-tutorial instruction?

Chapter 4

Results

In examining the usefulness of video-tutorials for meeting student needs, I discuss the results of this study in four sections: Help Requests, Help time, Achievement, and Student Survey Data.

Help Requests

To measure whether video tutorials were meeting student needs for instructional support, data on the number of student requests for assistance from the teacher and from peers was collected for both teacher-led and video-led lessons. With regard to requests for teacher assistance, all three classroom divisions showed fewer requests for assistance and a lower request per student ratio during video-led lessons than during teacher-led lessons (Table 1). The combined means for all three divisions show that teacher-led lessons averaged 0.84 requests per student while video-led lessons showed 0.39 requests per student for teacher assistance (Table 2). A t-test was conducted to compare request per student ratios during video-led and teacher-led lessons. Using the combined means for all three divisions there was a statistically significant difference in the means for teacher-led lessons ($M = 0.84$, $SD = 0.13$) and video-led lessons ($M = 0.39$, $SD = 0.15$); $t(11) = 7.94$, $p < .05$. The value of Cohen's *d*, 3.35, is a large effect according to Cohen, who noted that "large" effects begin at the value 0.8 (Cohen, 1988). These results support the conclusion that fewer requests for teacher assistance were made by students using video-tutorials.

Table 1

Summary of Help Requests from Teacher Data

4/5A Requests for Help During Teacher-led and Video-led Lessons

Lesson Type	TL	VL	TL	VL	TL	VL	TL	VL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	Mean	Mean
Request Ratio	0.69	0.21	0.72	0.55	1.00	0.42	0.89	0.30	0.83	0.37
Requests	11	4	13	11	19	8	17	6	15.0	7.3
Requesters	7	3	8	9	12	7	12	5	9.8	6.0
Students	16	19	18	20	19	19	19	20	18.0	19.5
Help time (sec.)	247	130	265	318	591	193	521	143	406	196

6/7A Requests for Help During Teacher-led and Video-led Lessons

Lesson Type	VL	TL	VL	TL	VL	TL	VL	TL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	Mean	Mean
Request Ratio	0.42	0.81	0.32	0.94	0.20	1.00	0.33	0.88	0.91	0.32
Requests	5	17	6	17	4	15	5	15	16.0	5.0
Requesters	5	12	4	11	4	11	3	10	11.0	4.0
Students	12	21	19	18	20	15	15	17	17.8	16.5
Help time (sec.)	210	487	145	744	159	542	192	472	561	177

6/7B Requests for Help During Teacher-led and Video-led Lessons

Lesson Type	TL	VL	TL	VL	TL	VL	TL	VL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	Mean	Mean
Request Ratio	0.63	0.24	0.95	0.67	0.72	0.59	0.82	0.44	0.78	0.48
Requests	10	4	18	12	13	10	14	8	13.8	8.5
Requesters	8	3	10	6	12	5	8	6	9.5	5.0
Students	16	17	19	18	18	17	17	18	17.5	17.5
Help time (sec.)	256	125	498	389	483	276	367	222	401	253

Note: TL=Teacher-led, VL=Video-led, W=Word Processing, P=Power Point, FA=Power Point Flip Animation, E=Excel Spreadsheet. Request Ratio is the ratio of help requests per student.

Table 2

Student Help Requests of Teacher: Means for All Groups

Lesson Type	Teacher-led	Video-Tutorial
Request Ratio	0.84	0.39
Requests	14.9	6.9
Requesters	10.1	5.0
Students	17.8	17.8
Help time (sec.)	456	209

Note: Students: n=61, Teacher-led lessons: n=12, Video-led lessons: n=12 (4 teacher-led lessons and 4-video-tutorial lessons for each of 3 divisions=24 lessons in total).

At the end of each lesson students were asked to submit their tallies of how many times they had requested and received assistance from classmates during the lesson. During teacher-led lessons, students in all three divisions relied more on peer than teacher help to complete their assignments. During video tutorial lessons, students in each division requested less help from their peers than they did during teacher-led lessons. The overall peer help request per student ratio was 0.20 for video-led lessons and 0.62 during teacher-led lessons (Table 3). A t-test was conducted to compare request per student ratios for peer assistance during video-led and teacher-led lessons. Using the combined means for all three divisions there was a statistically significant difference in the means for teacher-led lessons ($M = 0.62$, $SD = 0.27$) and video-led lessons ($M = 0.20$, $SD = 0.13$); $t(11) = 4.36$, $p < 0.01$. The value of Cohen's *d*, 2.07, is a large effect (Cohen, 1988). These results support the observation that fewer requests for assistance from peers were made by students using video-tutorials.

Table 3

Peer Help Requests During Teacher-Led and Video-Led Lessons

	4/5A Requests for Peer Help									
Lesson Type	TL	VL	TL	VL	TL	VL	TL	VL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	M	M
Peer Help	10	6	13	8	9	4	15	0	47	18
Students	16	19	18	20	19	19	19	20	72	78
Help/Student Ratio	0.63	0.32	0.72	0.40	0.47	0.21	0.79	0.00	0.65	0.23

	6/7A Requests for Peer Help									
Lesson Type	VL	TL	VL	TL	VL	TL	VL	TL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	M	M
Peer Help	2	12	4	7	2	19	3	3	41	11
Students	12	21	19	18	20	15	15	17	71	66
Help/Student Ratio	0.17	0.57	0.21	0.39	0.10	1.27	0.20	0.18	0.58	0.17

	6/7B Requests for Peer Help									
Lesson Type	TL	VL	TL	VL	TL	VL	TL	VL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	M	M
Peer Help	7	2	10	8	12	3	13	1	42	14
Students	16	17	19	18	18	17	17	18	70	70
Help/Student Ratio	0.44	0.12	0.53	0.44	0.67	0.18	0.76	0.06	0.60	0.20

	TL	VL
Peer Help/Student Ratio	0.62	0.20

Note: TL=Teacher-led, VL=Video-led, W=Word Processing, M=Mean, P=Power Point, FA=Power Point Flip Animation, E=Excel Spreadsheet. Help/Student Ratio is the ratio of peer help requests per student.

Help Time

Data on the amount of help time provided to students during both teacher-led and video-led lessons shows that students required more teacher help time during teacher-led lessons and less teacher help time during video-led lessons (see Table 4). Of the total help time provided, teacher-led lessons accounted for

69% whereas video-led lessons accounted for 31% of the help time (Table 4). A t-test was conducted to compare teacher help time per student ratios during video-led and teacher-led lessons. Using the combined means for all three divisions there was a significant difference in the means for teacher-led lessons ($M = 25.65$, $SD = 8.17$) and video-led lessons ($M = 11.96$, $SD = 4.93$); $t(11) = 4.62$, $p < 0.05$. The value of Cohen's *d*, 2.12, is a large effect. These results support the conclusion that when students were using video tutorials they completed their assignments with less assistance time from the teacher than when they were in teacher-led lessons.

Achievement

Pretest and posttest results were collected for each class to measure student achievement for both teacher-led (Table 5) and video-led lessons (Table 6). Descriptions of the specific word processing, Power Point, and spreadsheet skills assessed are provided in Appendix C. Samples of word processing tests are provided in Appendices E – H and samples of spreadsheet tests are presented in Appendices I and J.

The means for performance on pretests prior to teacher-led and video-led lessons were extremely similar, 0.23 and 0.22 respectively. Two sample t-tests were conducted to compare the means of posttests during video-led and teacher-led lessons. There is a statistically significant difference between teacher-led lesson posttests ($M = 0.87$, $SD = 0.03$) and video-led lesson posttests ($M = 0.91$, $SD = 0.03$); $t(11) = 2.99$, $p < 0.05$. The value of Cohen's *d*, 1.39, is a large effect (Cohen, 1988). These results support the conclusion that students performed

better on posttests following video tutorial lessons than they did on the posttests that followed teacher-led lessons in computer skills.

Table 4

Teacher Help Time During Teacher-Led and Video-Led Lessons

Division 4/5 A	TL	VL	TL	VL	TL	VL	TL	VL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	Total	Total
Help time (sec.)	247	130	265	318	591	193	521	143	1624	784
Students	16	19	18	20	19	19	19	20	72	78
							Help Time/Student		22.56	10.05
Division 6/7 A	VL	TL	VL	TL	VL	TL	VL	TL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	Total	Total
Help time (sec.)	210	487	145	744	159	542	192	472	2245	706
Students	12	21	19	18	20	15	15	17	71	66
							Help Time/Student		31.62	10.70
Division 6/7 B	TL	VL	TL	VL	TL	VL	TL	VL	TL	VL
Lesson	W2	W3	W4	P3	FA	E2	E3	E4	Total	Total
Help time (sec.)	256	125	498	389	483	276	367	222	1604	1012
Students	16	17	19	18	18	17	17	18	70	70
							Help Time/Student		22.91	14.46
									TL	VL
								Total Time	5473	2502
								% of Help Time	69%	31%
								Help Time/Student	25.65	11.96

Note: TL=Teacher-led, VL=Video-led, W=Word Processing, P=Power Point, FA=Power Point Flip Animation, E=Excel Spreadsheet. Help/Student Ratio is the ratio of peer help requests per student.

Table 5

Pretest and Posttest Means for Teacher-Led Lessons

4/5A	Pre	Post	Max.	Pre %	Post %
W2	8.2	27.7	30	0.27	0.92
W4	3.15	16.15	18	0.18	0.90
FA	5.3	25.5	30	0.18	0.85
E3	0	23.75	27	0.00	0.88
				Pre %	Post %
			Mean Scores	0.16	0.89

6/7A	Pre	Post	Max.	Pre %	Post %
W3	5.33	15.86	18	0.30	0.88
P3	7.81	16.05	18	0.43	0.89
E2	8.38	24.29	30	0.28	0.81
E4	0.00	21.14	24	0.00	0.88
				Pre %	Post %
			Mean Scores	0.25	0.87

6/7B	Pre	Post	Max.	Pre %	Post %
W2	14.6	26.7	30	0.49	0.89
W4	6.4	15.9	18	0.36	0.88
FA	7.2	25.65	30	0.24	0.86
E3	1.65	22.25	27	0.06	0.82
				Pre %	Post %
			Mean Scores	0.29	0.86
			Mean (All Classes)	0.23	0.87

Note: TL=Teacher-led, VL=Video-led, W=Word Processing, P=Power Point, FA=Power Point Flip Animation, E=Excel Spreadsheet. Max.=Maximum score possible, Pre=Pretest, Post=Posttest. Students in each division: 4/5A (n=20), 6/7A (n=21), 6/7B (n=20).

Table 6

Pretest and Posttest Means for Video-Led Lessons

4/5A	Pre	Post	Max.	Pre %	Post %
W3	3.85	16.90	18	0.21	0.94
P3	1.55	15.85	18	0.09	0.88
E2	6.00	26.05	30	0.20	0.87
E4	0	22.10	24	0.00	0.92
				Pre %	Post %
			Mean Scores	0.13	0.90

6/7A	Pre	Post	Max.	Pre %	Post %
W2	17.05	28.48	30	0.57	0.95
W4	6.19	16.81	18	0.34	0.93
FA	6.95	27.71	30	0.23	0.92
E3	1.19	23.95	27	0.04	0.89
				Pre %	Post %
			Mean Scores	0.30	0.92

6/7B	Pre	Post	Max.	Pre %	Post %
W3	4.35	16.30	18	0.24	0.91
P3	6.40	16.40	18	0.36	0.91
E2	8.90	25.25	30	0.30	0.84
E4	0.15	21.60	24	0.01	0.90
				Pre %	Post %
			Mean Scores	0.23	0.92
			Mean % for All Classes	0.22	0.91

Note: TL=Teacher-led, VL=Video-led, W=Word Processing, P=Power Point, FA=Power Point Flip Animation, E=Excel Spreadsheet. Max.=Maximum score possible, Pre=Pretest, Post=Posttest. Students in each division: 4/5A (n=20), 6/7A (n=21), 6/7B (n=20).

Student Survey Results

Survey responses from this group of grade 4 through 7 students showed very positive attitudes towards using computers and towards learning computer skills. Ninety-eight percent of students reported that they either liked (47%) or strongly liked (51%) using computers at school. Sixty-six percent reported that

they liked learning computer skills and 28% reported that they strongly liked learning computer skills (Table 7).

Ninety-one percent reported that most of the time they found it either somewhat easy (55%) or very easy (36%) to learn new computer skills. Eleven percent of students reported that video tutorials neither made it easier nor more difficult to learn new computer skills, while 43% reported that it made it easier and 47% felt that video tutorials made it much easier for learning new skills. The majority of students (81%) either liked (55%) or strongly liked (26%) using video tutorials for learning while 11% neither liked nor disliked them, and 9% disliked using them (Table 7).

As another measure of the degree to which video-tutorials may or may not serve students' individual needs for support and pacing, students were asked to indicate the degree to which they utilized options such as pausing the video, viewing or replaying the video in segments, or skipping portions of the video. Most students reported utilizing options of controlling both the pace and sequence of instruction when viewing video-led lessons. When learning by video, 91% reported using the option to pause the video, 85% reported viewing the video in segments rather than as one continuous video, 64% reported replaying some segments for better understanding, and 81% reported skipping parts of the video that they thought they already understood (Table 7).

Table 7

Student Survey Results

Question	Strongly Dislike 1	Dislike 2	Neither 3	Like 4	Strongly Like 5	Responses
1. How do feel you about using a computer at school?	0%	0%	2%	47%	51%	47
2. How do you feel about learning computer skills?	0%	2%	4%	66%	28%	47

	Very Difficult	Somewhat Difficult	Neither	Somewhat Easy	Very Easy	Responses
3. Most of the time do you find it easy or difficult to learn new computer skills?	0%	4%	4%	55%	36%	47

	Much More Difficult	More Difficult	Neither	Easier	Much Easier	Responses
4. Do video tutorials make it more difficult or easier to learn new computer skills?	0%	0%	11%	43%	47%	47

	Strongly Dislike	Dislike	Neither	Like	Strongly Like	Responses
5. How do you feel about using video tutorials for learning?	0%	9%	11%	55%	26%	47

	Needed Much More Help	Needed More Help	Neither	Needed Less Help	Needed Much Less Help	Responses
6. When using video tutorials, do you find that you need less help or more help from the teacher?	0%	4%	13%	41%	41%	46
7. When using video tutorials, do you find that you need less help or more help from the Educational Assistant?	0%	0%	25%	39%	36%	28

8. When using video tutorials, do you find that you need less help or more help from other students?	0%	9%	23%	32%	36%	47
	Much Worse	Worse	Neither	Better	Much Better	Responses
9. How well did you understand lesson instructions when you used a video tutorial?	0%	4%	0%	49%	47%	47
	Way too fast	A little fast	Just about right	A little slow	Way too slow	Responses
10. How did you find the pace of teacher-led computer skills lessons?	0%	6%	62%	28%	4%	47
11. How did you find the pace of video-tutorial computer skill lessons?	0%	6%	55%	30%	9%	47
	At no time	Once or twice	3 or 4 times	5 or 6 times	7 or more times	Responses
12. When learning by video-tutorial how often did you pause the video?	9%	43%	32%	11%	6%	47
	Never	Once or twice	Some times	Many Times	Every Time	Responses
13. Did you view the video in segments?	15%	19%	43%	19%	4%	47
14. Did you replay some parts of the video to better understand it?	36%	30%	30%	2%	2%	47
15. Did you skip parts of the video that you thought you already understood?	19%	19%	32%	26%	4%	47

Note: 61 students were invited to complete the survey. Parental permission was provided for 47 students. The percentages listed may not add up 100 due to rounding.

Chapter 5

Discussion

In this project I have compared teacher-led and video tutorial-led lessons with regard to meeting student needs for pacing and support during computer skills lessons. This study shows that video tutorial lessons can be an effective method for intermediate level students to learn computer skills. Video-led lessons provide a number of advantages: students control the pace and sequence of segments of the lesson by pausing or replaying segments to suit their own needs; students have access to the lesson information as they need it and are not tied to the pace of a teacher-led lesson; students are able to complete their assignments more independently with less help from the teacher or from fellow students; and the teacher has more time to monitor student progress and assist those who need help. Additional benefits of video tutorial lessons were that learners reported very positive attitudes towards using video tutorials and most felt that video tutorials made learning computer skills easier for them and helped them to understand the lessons better.

Student perceptions that video tutorials made learning easier and helped them understand the lesson better were supported by posttest results. The mean performance on posttests after video-led lessons was higher than the mean performance on posttests after teacher-led lessons. It is noteworthy that these results for video tutorial learners were achieved with less support from the teacher or their peers than during teacher-led lessons. In the context of video tutorials, users' positive attitudes towards the helpfulness of video tutorials, their success at completing lessons with fewer requests for assistance and less

teacher help time provided, and their higher posttest results, we can infer that video tutorials were helpful in meeting learners' individual needs for instructional pacing and support.

Limitations

The lessons used in this study represent basic and structured demonstrations of procedural knowledge and skills for using word processing, PowerPoint, and spreadsheet software in computer skills classes. The effectiveness of video tutorial lessons for other types of lessons or for teaching skills or concepts in other subject areas was not studied.

This study focused on discerning whether there were differences in the amount of support students required when receiving video-led and teacher-led lessons. The analysis of data focused on the mean results for both teacher-led and video-led groups. How teacher-led and video-led lessons may affect individual students with differing learning styles, aptitudes, or other individual characteristics was outside the scope of this study.

The data from this study represent results for three elementary school classes. Given the lack of video tutorial research with elementary school age learners, further research and comparisons with grade 4-7 learners would be required to determine the degree to which results of this study would be representative of the general population. Samples sizes in this study were small. Data used for the analysis in this study were drawn from 3 classrooms (Grades 4 & 5, n=20; Grades 6 & 7, n=21; Grades 6 & 7, n=20) with each group receiving 4 teacher-led lessons and 4 video-led lessons.

This research showed that learners in grades 4-7 have positive attitudes towards using video tutorials, students request less support during video-led lessons, and students showed some improvements in achievement on posttests after using video tutorials. However it was beyond the scope of this study to isolate and discern the specific causal factors or attributes of video-led lessons that may have contributed to their effectiveness.

Implications for Practice

The results of this study indicate that video tutorial lessons should be considered as an effective method for delivering lessons to learners for several reasons. Students view video tutorials as a means of learning that they like to use and they perceive that video tutorials make learning easier and more understandable for them. This study has shown that video tutorials may enable learners to master the lessons as well or better than during teacher-led lessons. Video tutorials may be useful as an effective way to meet many and diverse student needs simultaneously in a manner that permits students greater control over instructional pacing and support and permits them to complete assignments more independently than during teacher-led lessons. In such instances, teachers have more time to monitor and support more student needs or provide a greater depth of support for those who need it.

The effectiveness of video tutorials in this study provides sufficient evidence to consider their potential for providing teachers with more instructional delivery options. For the types of lessons that are not dependent on oral interaction and discussion, video tutorials can be useful media for

accommodating student needs independently of time and place. Students who miss a lesson or require a review can utilize the video tutorials on their own time. For procedural learning, such as with computer skills, students can access the instructional segments immediately and as they are needed while working through their projects. Recorded video lessons provide increased flexibility in the timing of lesson delivery for teachers and learners. Lessons can be viewed at times that suit various schedules, thereby permitting whole-class instructional time to be devoted to learning activities that benefit from interactions with others in the forms of discussing, processing, and applying skills and knowledge from lessons.

For the purposes of this study, even though video tutorials provided less support demands on the teacher, enriched support was not provided to video tutorial learners so as to avoid introducing another variable. Given that video-tutorial instruction enables students to work more independently with less teacher support, teachers utilizing video-led lessons and support in their classrooms should have more time to monitor and support student needs. In lessons where the application of computer skills is integrated with subject area content, the use of video tutorial support to guide students through the computer-related tasks may enhance the learning of those tasks while simultaneously freeing up instructional support to be devoted to instruction and support of the subject area content.

Students had control over the pace and viewing sequence of the segments in the video tutorials, but the same set of video segments was

provided for all video-led learners to parallel the instruction delivered in each of the teacher-led lessons. Just as with teacher-led instruction, the video-led lessons were appropriate for the majority of the class despite the fact that some students may have benefitted from simpler or more complex lessons. However, video tutorial instruction affords increased opportunities for differentiation of instruction and support through the preparation of different videos targeted towards different needs groups in the class. Video clips with different levels of detail and complexity, or even completely different topics could be prepared and delivered simultaneously to accommodate diverse student needs.

For many lessons, the interactions between learners, between learners and the teacher, and the on-going monitoring, adjustment, and adaptation to learner needs by the teacher are key factors in fostering successful learning. Those are the types of lessons that require "live" lesson delivery. Other lessons that involve non-interactive demonstrations, explanations, narratives, and lectures can often be delivered effectively using video lessons while providing the student with some control of the instruction in accordance with their needs and preferences. In those types of lessons, video lessons can play a key role in a flipped classroom approach to lesson delivery. The effectiveness of video tutorials in this study indicates that it would be worthwhile examining which types of lessons at the elementary level are more effectively delivered asynchronously using video tutorials and which are more appropriately delivered synchronously and directly by the teacher.

Implications for Future Research

The results of this study show that video tutorials may provide educators with additional means for effectively serving the instructional needs of their learners. In future research it would be valuable to study the effectiveness of video tutorials with larger numbers of lessons, varied types of video tutorial presentation, and more varied subjects and types of lessons and learning tasks to understand more clearly where video tutorial instruction will be most beneficial to learners and educators in the elementary school.

Future research on the effectiveness of video-led lessons with different types of learners would also be valuable. Are learners with some traits more likely to effectively use and benefit from video tutorial lessons? How do varying degrees of academic needs, maturity, metacognition, and self-monitoring behaviors of learners affect the effectiveness of video tutorial learning at the elementary school level? Does the use of video tutorials help students to develop their proficiency and independence in assessing their comprehension of lessons and taking actions to address their own needs?

The use of video tutorials for instruction is not a common practice at the elementary school level. Given the lack of research on the use of video tutorials in regular classrooms at the elementary school level, it is important to study the potential benefits and understand the limitations of using video tutorials with young learners. This study makes a contribution to helping us understand the potential usefulness of this method of instructional delivery for young students and their receptivity to it. More research is required to understand more clearly

how video tutorials may be effectively utilized in various areas of learning to serve the needs of elementary school learners.

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Appendices

Appendix A

Parental Consent Information Letter and Signature Form

November 14, 2011

Dear Parents

As teachers, we often test new strategies and methods of teaching as part of our work to improve learning and success for the learners that we teach. Currently, I am beginning a more formal research project to study whether providing access to video-tutorials may help students to progress through computer skills lessons at their own pace and receive the help they need. I will be submitting a formal report of this project to meet some of my course requirements in the Master of Education program with the University of Northern British Columbia.

In the process of assessing whether the use of video-tutorials in computer skills lessons is effective, I will be collecting data to compare the effectiveness of both video tutorial and teacher-led lessons for meeting student needs. I will also be asking the students to respond to a multiple-choice survey to collect their opinions about video-tutorials and whether or not they found them helpful. Any responses or data collected from your child will be assigned a random number so that all responses will be anonymous. No names or individual student information will be attached to any of the responses. Nevertheless, in order for your child's anonymous feedback to be included as a part of this study, I require your parental consent.

I have attached some more detailed information about this study for your information. I would appreciate your permission to include anonymous feedback from your child in this study. If you are willing to grant me that permission, please complete and sign the consent section of the attached form and return all pages to me at William Konkin Elementary School. A copy of the signed forms will be returned to you.

Sincerely,

David Beck
Computer Skills Teacher
William Konkin Elementary School
Burns Lake, B.C.

Appendix B

Informed Consent Form for the Parents of Study Participants

Self-paced Video Tutorial Study

UNBC - Professional Research Project, 2011-2012

By David Beck

The purpose of this study is to assess whether the use of video-tutorials can improve student learning and independence in completing computer skills assignments by giving them control of the pace of the instruction and enabling them to pause or review sections according to their individual needs.

How are participants chosen for this study?

Your child is a member of a class that receives computer technology instruction at William Konkin Elementary school. Your child's class will have the opportunity to participate in lessons supported by video tutorials; therefore, your child is invited to participate in this study. All students will receive some video-supported lessons and will be asked to provide feedback on the usefulness of video lessons. Parental consent is required so that student responses may be included in the study. Consent may be withdrawn at any time. If consent is withdrawn, the information provided by your child will be removed from the data set, deleted and/or shredded, and not used in the analysis or for any reports or presentations.

What will students be asked to do?

Students will be asked to view teacher-recorded video tutorials on the computer to guide them through to the completion of computer skills assignments. Students will also be asked to view, pause, and review the instructional videos as needed in order to proceed at their own pace and help them to complete their assignments successfully.

After using the video-guided tutorials, student participants will be asked to explain what they may have liked or disliked about using video-supplemented lessons.

Data from the study

Data will be collected showing:

- The number of requests for teacher or teacher aid help during teacher-led lessons and video-tutorial lessons.
- Learning progress during video-tutorial and teacher-led lessons.
- Anonymous survey responses about students' opinions of video-tutorial lessons (see attached survey).

The data from students will be assigned numbers to ensure that no names or identifying information is attached to data that is analyzed or presented in this study. Student names and information will be anonymous. No names will be associated with any of the data in this study.

Information Storage and Access to the Data

The data collected will be stored in a locked file cabinet in Mr. Beck's office at William Konkin Elementary School, to which only Mr. Beck will have access. A summary report of the data and the project will be made available after project completion to anyone interested. Data sheets will be stored until the end of June 2013 and then will be shredded.

Potential Benefits and/or Risks

Participation in this study will benefit your school and district by contributing to increasing knowledge and understanding of the effectiveness of alternative methods of lesson presentation in order to meet the individual needs of students. Individualized, differentiated, or personalized teaching and learning methods that are proposed by teachers for research purposes have to be evaluated and approved by the school district and approved by its superintendent before they can be implemented. This evaluation assures that the methods proposed are innovations in teaching that are supported by existing educational research and compatible with the prescribed curriculum of the Province of British Columbia. For these reasons, the potential risks in this study are limited to one. This is that for some or all students the new method, video tutorials, may not be as effective as the conventional method, teacher-led lessons. To minimize this risk, the learning of each student and the effectiveness of both methods will be evaluated four times during the period of this study. Each of these evaluations will be analyzed and monitored to determine if the new method is sufficiently ineffective for some or all students that its use should and will be discontinued.

Questions or Concerns about this Study

If you have questions about this study, please contact the researcher, Mr. David Beck, at 250-691-3146 or by email at beckk@unbc.ca. Mr. Beck's supervisor at UNBC may be contacted by calling: Dr. Bryan Hartman (250-960-6647). If you

have any concerns or complaints about this study you are encouraged to contact the UNBC Office of Research at reb@unbc.ca or 250 960-5650.

How do you get a copy of the results?

A summary of the study will be shared with students in the form of a PowerPoint presentation during one of their Computer Technology classes before the end of the 2011-2012 school year.

An executive summary will be presented to interested parents and School District #91 personnel at a public meeting to be announced before the end of the 2011-2012 school year. Consenting parents/guardians will be notified of the time and location of the meeting. Others interested may contact Mr. David Beck (250 692-3146 or beckk@unbc.ca).

I give consent for my child to participate in the "Self-paced Video-Tutorial" study as described in this Information Letter.

Child's Name: _____

Parent Signature: _____ Date: _____

Printed Name of Parent: _____

Appendix C

Pretest and Posttest Skills

Word Processing 2 - Pretest ____ Posttest ____ Name:

The student can	Points
insert characters within words by inserting the cursor insertion point in the correct position.	/3
delete characters by inserting cursor and backspacing.	/3
highlight text by clicking and dragging, double-clicking the word, and shift and then shift-click selections.	/3
insert line spaces between paragraphs.	/3
center align text.	/3
left align text.	/3
right align text.	/3
make text bold/undo bold using the menu ribbon and mini-toolbar.	/3
italicize text/undo italics using the ribbon menu, mini-toolbar, and right click drop down menu.	/3
underline text or remove underlining using the menu button or Ctrl-U.	/3
Total	/30

Word Processing 3 - Pretest ____ Posttest ____ Name:

The student can	Points
show how to identify the font style of a word on the screen.	/3
change the font using the right-click toolbar and hover menu over highlighted text.	/3
change the font size using the ribbon menu, drop down menu, or the hover menu.	/3
change the font size using the font grow or font shrink buttons.	/3
change text between uppercase and lowercase using shift and caps lock keys.	/3
toggle the text case to create sentence case, lowercase, uppercase, and capitalize each word.	/3
Total	/18

Word Processing 4 - Pretest ____ Posttest ____ Name:

The student can	Points
colour highlight words by double-clicking.	/1
colour highlight sentences by triple-clicking.	/1
change the text colour.	/3
create and undo text background highlighting.	/3
toggle text case.	/3
insert asterisks.	/1
change fonts using decorative fonts.	/3
use the shrink and grow font buttons to toggle the font to appropriate sizes.	/3
Total	/18

Power Point 3 - Pretest ____ Posttest ____ Name:

The student can	Points
add a gradient fill background to slides.	/3
change from the default layout to a blank slide.	/1
copy and paste images on to a slide.	/2
crop and size images.	/3
add a text box and adjust its size and background colour.	/3
add speech bubbles with text and adjust their size, position, and background.	/3
use custom animation to make objects (speech bubbles and text box) appear after previous objects with a 3 second delay.	/3
Total	/18

PowerPoint Flip Animation - Pretest ____ Posttest ____ Name:

The student can	Points
change from the default layout to a blank slide.	/1
use shape tool to draw a line with 3 curves.	/3
insert and resize a graphic.	/3
use ctrl and arrow keys to reposition a graphic.	/3
shift a graphic appropriate distances in each frame for animation.	/6
rotate graphics as needed in each frame for animation.	/3
duplicate slides to create new frames.	/3
add a 2nd animated graphic.	/1
use copy/paste technique to shift position of 2nd graphic on existing slides.	/3
set up slide transition timing.	/3
control line of movement along curved line from frame to frame to maintain smooth animation.	/1
Total	/30

Excel 2 - Pretest ____ Posttest ____ Name:

The student can	Points
add columns in the middle of a spreadsheet.	/3
add text labels.	/3
copy cells from one location to another.	/3
use background fill in selected cells.	/3
use text orientation for angled column labels.	/3
add a formulas to calculate the sums of cell values.	/3
add division formulas to calculate percentages.	/3
format cells to display values as percentages.	/3
create a pie graph with a title and with percentages labeled.	/3
create a column graph with a title.	/3
Total	/30

Excel 3 - Pretest ____ Posttest ____ Name:

The student can	Points
enter a formula to calculate differences between values in cells (e.g. =B3-C3).	/10
use the auto sum feature to calculate sums of values in adjacent cells.	/2
calculate sums of cell values using a basic addition formula (e.g. =C2+C3+C4…).	/7
add non-adjacent cells using a basic addition formula (e.g. =C2+E5) or sum function (e.g. =sum(C2,C5,E3)).	/8
automatically insert a value from another cell into a cell (e.g. =B4).	/2
Total	/27

Excel 4 - Pretest ____ Posttest ____ Name:

The student can create formulas that	Points
multiply daily values by 7 to produce weekly estimates.	/4
multiply daily values by 30.42) to produce monthly estimates.	/4
multiply daily values by 365 to produce yearly estimates.	/4
divide yearly values by 12 to calculate monthly averages.	/4
divide yearly values by 52 to calculate weekly averages.	/4
divide yearly values by 365 to calculate daily averages.	/4
Total	/24

Appendix D

Self-Paced Video-Tutorial Study

Student Feedback Survey (SAMPLE COPY)

Part 1: Circle the response that best shows how you feel.

How do you feel about using the computer at school?

Strongly dislike Dislike Neither Like Strongly like

How do you feel about learning computer skills?

Strongly dislike Dislike Neither Like Strongly like

Most of the time, do you find it easy or difficult to learn new computer skills?

Very difficult Somewhat Difficult Neither Somewhat Easy Very Easy

Do video tutorials make it more difficult or easier to learn new computer skills?

Much more difficult More difficult Neither Easier Much easier

How did you feel about using video tutorials for learning?

Strongly dislike Dislike Neither Like Strongly like

When using video tutorials, do you find that you need less help or more help from the teacher?

Needed much more help Needed more help Neither Needed less help Needed much less help

When using video tutorials, do you find that you need less help or more help from the EA?

Needed much more help Needed more help Neither Needed less help Needed much less help

When using video tutorials, do you find that you need less help or more help from other students?

Needed much more help	Needed more help	Neither	Needed less help	Needed much less help

How well did you understand lesson instructions when you used a video tutorial?

Much worse	Worse	Neither	Better	Much better

How did you find the pace of teacher-led computer skills lessons?

Way too fast	A little fast	Just about right	A little slow	Way too slow

How did you find the pace of video tutorial computer skill lessons?

Way too fast	A little fast	Just about right	A little slow	Way too slow

Part 2: Circle the response that best describes how often each occurred.

When learning by video tutorial how often did you pause the video?

At no time	Once or twice	3 or 4 times	5 or 6 times	7 or more times

Did you view the video in segments?

Never	Once or twice	Sometimes	Many times	Every time

Did you replay some parts of the video to better understand it?

Never	Once or twice	Sometimes	Many times	Every time

Did you skip parts of the video that you thought you already understood?

Never	Once or twice	Sometimes	Many times	Every time

Part 3: Write thoughts or comments about video tutorials in the spaces below.

1. Describe anything that you liked about using video tutorials.

2. Describe anything that you did not like about using video tutorials.

3. Write any other comments that you may have about video tutorial lessons.

Appendix E

Word Processing Test 2 (Working File)

Word Processing Test 2

Name: Stu **Dent**

Date:

Dear Teacher

This is an example of things I can do with Microsoft Word. I can underline some words in a sentence. I can write some words in italic style like this. When I want to emphasize words I can format them in bold style like this.

Underlined bold italic underlined bold italic underlined bold italic bold italic underlined bold italic underlined. This next sentence is in italics. This **sentence** is *converted* to normal **text**. This entire sentence is bold.

A paragraph that is right aligned. This paragraph is should be straight on the right margin and ragged on the left margin. A paragraph that is right aligned. This sample paragraph is should be straight on the right margin and ragged on the left margin. A paragraph that is right aligned.

A paragraph that is left aligned. This paragraph is should be straight on the left margin and ragged on the right margin. A paragraph that is left aligned. This sample paragraph is should be straight on the left margin and ragged on the right margin.

A paragraph that is center aligned.
This paragraph is should be ragged on the left margin and on the right margins.
Every line should be centered.
This is most useful for poems, posters, and headings.
It is not very useful for regular paragraphs.

This is a paragraph that is justified. You should notice that the left and right margins are even, or straight, on the edges. This is achieved by evenly spacing out the words so that the first and last letters on each complete line are aligned with the margin. This is useful if your text is not too big. If it is, or if the words are very long, you can end up with some very strange looking spacing. You will often see justified text in columns in magazines where both edges of text are straight.

In ths sntnce I hve insrtd the cursor and insrtd the lrs that wr missg.
In thiszzzz szzentence I hzzave inserted the cxxxursor and dexxxlezzted the

exxxxtra consonzzzzant letters.

Appendix F

Word Processing Test 2 (Completed)

Name: Stu Dent

Date: November 1, 2011

Dear Teacher

This is an example of things I can do with Microsoft Word. I can underline some words in a sentence. I *can* write *some* words in *italic* style like *this*. **When I want** to **emphasize** words I can **format** them in **bold style** like **this**.

Underlined **bold** *italic* underlined **bold** *italic* underlined **bold** *italic* **bold** *italic* underlined **bold** *italic* underlined. *This next sentence is in italics.* This sentence is converted to normal text. **This entire sentence is bold.**

A paragraph that is right aligned. This paragraph is should be straight on the right margin and ragged on the left margin. A paragraph that is right aligned. This sample paragraph is should be straight on the right margin and ragged on the left margin. A paragraph that is right aligned.

A paragraph that is left aligned. This paragraph is should be straight on the left margin and ragged on the right margin. A paragraph that is left aligned. This sample paragraph is should be straight on the left margin and ragged on the right margin.

A paragraph that is center aligned.
This paragraph is should be ragged on the left margin and on the right margins.
Every line should be centered.
This is most useful for poems, posters, and headings.
It is not very useful for regular paragraphs.

This is a paragraph that is justified. You should notice that the left and right margins are even, or straight, on the edges. This is achieved by evenly spacing out the words so that the first and last letters on each complete line are aligned with the margin. This is useful if your text is not too big. If it is, or if the words are very long, you can end up with some very strange looking spacing. You will often see justified text in columns in magazines where both edges of text are straight.

In this sentence I have inserted the cursor and inserted the letters that were missing.

In this sentence I have inserted the cursor and deleted the extra consonant letters.

Appendix G

Word Processing Test 3 (Working File)

Word Processing Test 3

Name: Stu Dent

Date: **November 9, 2011**

Dear Teacher

This is an example of things I can do with Microsoft Word. This sentence had **bold**, *italic*, and underlined words in a *different* font but I have changed it to normal text with arial font.

I am able to format words in different sizes. This is twenty four, eighteen, twenty, sixteen, fourteen, twenty-eight, twelve, ten, and nine point size.

Here are some font styles that I can use in Microsoft Word 2007: Arial, Times New Roman, Cooper Black, Tahoma, Comic Sans.

Here are some decorative font styles that I can use in Microsoft Word 2007: Jokerman, Curlz MT, Lucida Handwriting, Lucida Calligraphy, Old English.

i can use the change case button. THIS TEXT HAS BEEN CONVERTED TO SENTENCE CASE. so has this one. The First Part Of This Sentence Has Been Converted To Uppercase AND THE LAST PART TO LOWERCASE. capitalize each word option can be helpful for titles or headings.

Appendix H

Word Processing Test 3 (Completed)

Word Processing Test 3

Name: Stu Dent

Date: November 9, 2011

Dear Teacher

This is an example of things I can do with Microsoft Word. This sentence had bold, italic, and underlined words in a different font but I have changed it to normal text with Arial font.

I am able to format words in different sizes. This is twenty four, eighteen, twenty, sixteen, fourteen, twenty-eight, twelve, ten, and nine point size.

Here are some font styles that I can use in Microsoft Word 2007: Arial, Times New Roman, **Cooper Black**, Tahoma, Comic Sans.

Here are some decorative font styles that I can use in Microsoft Word 2007: Jokerman, Curlz MT, *Lucida Handwriting*, *Lucida Calligraphy*, Old English.

I can use the Change Case Button. This text has been converted to sentence case. So has this one. THE FIRST PART OF THIS SENTENCE HAS BEEN CONVERTED TO UPPERCASE and the last part to lowercase. Capitalize Each Word Option Can Be Helpful For Titles Or Headings.

Appendix I

Excel 2 Test

Open the file "Excel 2 Test". Complete as many of the following tasks as you can. (30 points)

- Add columns: Add 3 new columns between the "Day 1" and "Total columns". (3 pts.)
- Add text labels: Add labels for the Day 2, 3, and 4 columns. (3 pts.)
- Copy cells: Copy and paste the data cells from columns A, B, C to the new columns Day 2, 3, 4. (3 pts.)
- Background fill: Fill the cell background for the Day and Boat label cells and the Total and % of Catch columns with fill colours. (3 pts.)
- Text Orientation: Angle the column label text. (3 pts.)
- Sum formula: In the Total column, add formulas that calculate sums of the daily catch. (3 pts.)
- Division formula, cell format = %: In the "% of Catch" column, add formulas and format the cell to show the % of catch. (3 pts.)
- Sum formula: In the "Total" row, add formulas to provide sums of the numbers in each column. (3 pts.)
- Create a pie graph that shows the % of the total catch for each boat (include a graph title). (3 pts.)
- Create a column graph that shows the daily catches for the boats (include a graph title). (3 pts.)

Excel 2 Test working file:

	Day 1	Total	% of Catch	A	B	C
Boat 1	123			129	143	162
	324			535	820	394
	654			132	548	253
	245			923	649	381
Total						

Appendix J

Completed Excel 2 Test

Screen capture of a fully completed Excel 2 Test with spreadsheet, pie graph, and column graph:

Fish Caught in the Net

	Day 1	Day 2	Day 3	Day 4	Total	% of Catch
Boat 1	123	129	143	162	557	9%
Boat 2	324	535	820	394	2073	32%
Boat 3	654	132	548	253	1587	25%
Boat 4	245	923	649	381	2198	34%
Total	1346	1719	2160	1190	6415	100%