Running Head: Laptop program effects on student behaviour and achievement

Research Proposal (Final Assignment # 2): Is student behaviour and academic achievement affected by participating within one to one laptop programs?

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Introduction

Many schools have, or are implementing, one-to-one (1:1) laptop programs. Each student uses a laptop during class. The argument behind such programs is that in order for students to benefit from computers they must use a mobile internet device so they can always have the opportunity to learn (Lei, Conway, & Zhao, 2008). I am interested in this area because for the last three years I have concurrently taught 1:1 laptop-based and non-laptop based science 8 and 9 classes. Laptop students use their laptops to take notes, complete lab and unit assignments, and write blogs. Students have complained that laptop-based learning involves extra work; however, many of those same individuals are off-task during class by playing video games, checking social network websites, or watching videos. I decided it would be beneficial to study the 1:1 laptop learning environment's effect on student behaviour and academic achievement - whether it is an enhancement, a hindrance, or neither.

Statement of Problem

Personal observations have been made to compare laptop and non-laptop behaviours and academic achievement to determine if 1:1 laptop environments have been an enhancement or a hindrance. No significant observations have been made. The purpose of this study is to quantitatively analyze the effects of 1:1 laptop learning on student behaviour and academic achievement by comparing 1:1 laptop and non-laptop classes taught by the same teacher.

Literature Review

The literature review will examine previous research papers findings on 1:1 laptop student behaviours and academic achievement, and provide support for the study.

Behaviour

It was believed that laptops in classrooms would have a positive effect on student behaviours and achievement simply by engaging students in the learning process (Norris & Soloway, 2010). Studies on 1:1 laptop middle school programs were conducted to look at the effects of laptops on student behaviour, with contradictory findings noted in the literature (Lei, 2010; Bebell & Kay, 2010; Donavan, Green, & Hartley, 2010)

Lei's (2010) four year and Bebell and Kay's (2010) three year longitudinal studies found student behaviour positively responded while participating in laptop programs. Lei (2010) conducted student and teacher interviews and surveys, finding students entering the program to be off-task at first, but becoming more focussed as the computer novelty wore off. The results cannot be generalised as the number of students participating was not stated.

Bebel and Kay (2010) conducted teacher and administrator surveys and interviews, and conducted classroom observations, but did not use student surveys in arriving at their conclusions. Student engagement, motivation, aptitude for research, and collaboration increased. This conclusion is questionable without having used student survey results, and the fact that student attitudes towards laptop use could have altered the author's findings.

Donavan *et al's* (2010) one year, qualitative study used observations and interviews to identify three different grade 7 laptop learning environments. Students who appeared to be using their computers all the time were as off-task as students who did not. It was concluded that while laptops do not increase student academic engagement, they do increase motivation to use technology - but not for academic purposes. Although analysis of student off-task behaviour was

conducted, it is not possible for researchers to obtain a general idea of student off-task behaviour from only 60 hours of observations.

As indicated above, a positive correlation between laptops, improved student behaviour and academic achievement was expected (Norris & Solowy, 2010). However, contradictions in literature indicate further studies need to be conducted in this area.

Academic Achievement

Longitudinal studies have been conducted on 1:1 laptop middle school students' academic achievement (Bebell & Kay, 2010; Dunleavy & Heinecke, 2008; Gulek & Demirtas, 2005). A pre/post test control group design was used in each of the studies. However, different point-in-time and longitudinally statistical instruments were used to compare 1:1 laptop and non-laptop student groups' academic measures. Contradicting results were noted within the literature.

Bebell and Kay's (2010) statistical analysis of state exam marks indicated laptop use positively affected students' writing abilities, but not science or math. The paper initially pointed toward an increased math achievement due to laptop use, but later indicated that there was no effect.

Dunleavy & Heinecke's (2008) results were slightly different than Bebell and Kay (2010). Statistical analysis between experimental and control groups indicated laptop use increased students' science achievement, but not math. Interestingly, the authors indicated 100 grade 8 laptop students' marks were analysed; however, later tabular data indicated 54 and then 52 laptop students were a part of the experimental group. No explanation for the discrepancy in the experimental group numbers was provided.

Gulek and Demirtas (2005) used statistical analysis to conclude that students who participated in the laptop program obtained significantly higher achievement values for writing, language, mathematics, and GPA. Students volunteered to be a part of the laptop program. This may affect the studies external validity.

Teacher presence

Teachers have a large impact on student behaviour and academic achievement (Gulek & Demirtas, 2005) and affect the level of laptop use in class. Bebell and Kay (2010) noted a higher laptop use in social studies and the language arts. State exam marks in these areas improved with student laptop use. Students in Gulek and Demirtas (2005) study used their laptops on a daily basis. A positive correlation between laptop use and academic achievement was noted. Teacher pedagogical beliefs may have a larger influence on student achievement than does technology use (Gulek & Demirtas, 2005).

Concluding statement about literature

Contradicting 1:1 laptop program behaviour and academic achievement findings were noted in the literature. Multiple teachers were included in each study. Studies need to be conducted where a single teacher instructs both laptop and non-laptop learning environments to determine if laptops effect student behaviour and academic achievement.

Method

Design

Student surveys and a quasi-experimental pre/post test control group design will be used in this one school-year long study. Data on student behaviour will be collected with the use of

student self reflecting surveys. Academic achievement data will be collected through chapter tests and a year-end test. Baseline data will be established with two chapter tests conducted prior to treatment. The remainder of tests will be used to analyses effect of treatment on student academic achievement.

Participants

A single teacher will instruct four science 8 classes at a Greater Vancouver Regional District school. The teacher has concurrently taught 1:1 laptop and non-laptop science 8 classes for the past three years. Two classes will consist of a 1:1 laptop learning environment (experimental group) and two classes of non-laptop students (control).

Class numbers will not be known until time of study; however, past class composition can be used to approximate the number of students in each learning environment. Approximately 50 students will volunteer to participate within the 1:1 laptop classes while 60 controls will be randomly selected. Students come from affluent families and it will be their first year in a high school learning environment. Laptop students will bring personal laptops to class.

Instruments

Permission to conduct the study will be obtained prior to study commencement. Upon school administration permission, Informed Consent letters will be sent home for guardian signatures.

Behavioural data will be collected with use of student likert based surveys at the end of the treatment. To reduce threats to instrument validity both 1:1 laptop and non-laptop students will be surveyed (Gay, Mills, & Airasian, 2009). Researcher will design the survey. Survey will

collect student attitudes towards behavioural traits such as class engagement, motivation to learn, and off-task behaviour. Laptop student survey will also include questions specific to laptop class use on the above mentioned behavioural traits.

Chapter tests and a year-end test will be used to collect academic achievement data. All chapter tests will be created by the teacher to maintain consistency between the material being taught and tested. Chapter tests between the four classes will be slightly different to reduce cheating between the classes. Both groups will write a common year-end test.

Procedure

Permissions to conduct the study will be obtained. School permission will be obtained in the month of February, prior to starting the study the following September. Guardians of potential participants will be made aware of the study at a school program information night, typically hosted several months prior to enrolment. Study information and participation permission forms will be sent home to (enrolled) grade 8 students in the summer back-to-school mail-out. Completed permission forms will be collected in the second and third weeks of September.

The study will be conducted over one school year. Both groups of students will be taught the British Columbia Science 8 curriculum, consisting of twelve chapters. They will be taught in the same manner for the first two chapters (no laptops). Data on the tests from these chapters will determine the groups' baseline achievements.

At chapter three, the teaching methods will slightly change. Laptop students will be taught responsible classroom technology use. Both groups will be familiarized with the teacher website containing course skeleton notes. Laptop students will download, paste notes into

Microsoft's (MS) Onenote program (virtual binder), and type in missing sections during class. Non-laptop students will (prior to class) download notes and manually fill them in during class. Both groups will write reflective journal articles after each chapter. Laptop students will use a blog space and non-laptop students a notebook. Both groups will be given similar assignments and the same labs. Laptop groups will use computer software to complete and digitally submit using the course's learning management system (LMS). Non- laptop students will complete the same assignments by hand. For example, one of the assignments is a cell analogy, including images. Laptop students will use Adobe Photoshop or a paint program to create images, and MS Word to describe the analogy. Non-laptop students will accomplish the same by hand.

Academic data collection will occur at the end of each chapter, and at the end of the year. Year-end behavioural surveys will occur prior to the final exam.

Data analysis

Data will be quantitatively analyzed. Likert survey responses will be given a numerical value. Means of each question responses for each group will be calculated. Like questions will be statically compared using a "t" test to determine similarities in results with a 95 % significance level. Means of questions specific to 1:1 laptop students on how computers affect their class behaviour will be reported, analysed, and discussed.

Academic achievement will be compared between groups. A combined baseline mean score for chapters one and two will be created for each group. If there is a large difference in baseline means, chapter tests and year-end test means will be adjusted with an analysis of covariance (ANCOVA). Group chapter tests means and year-end test means will be compared using a "t" test with a 95 % significance level.

Limitations of study

Generalization and validity of results might be questionable. One-to-one laptop students volunteer to be a part of the laptop learning environment. This may make the ANCOVA results invalid and generalization of the findings questionable.

Significance of study

The review of literature presented contradictory findings regarding whether or not 1:1 laptop environments improve student behaviour and academic achievement. The studies were conducted with multiple teachers having varying instructional skills. It was uncertain if technology or teachers (or both) were affecting the learning environments. Removal of teacher variables (single teacher instructing both 1:1 laptop and non-laptop classes) will improve the data and analysis of the study.

Understanding how 1:1 laptop environments affect student behaviour and academic achievement is important, both to my own pedagogical growth (as a current 1:1 laptop science teacher) as well as the program. Research findings might influence future studies or professional development. If it is found that experimental 1:1 laptop environments have no significant effect on student behaviour or academic achievement, we could look at other methods of using computers for student learning enhancement; if there is a significant positive effect, professional development opportunities will become available based on the above teaching model.

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