Article Critique #3

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Does technology enhance student learning?
A literature synthesis

ETEC 500, Research Methodology in Education, Section 66C, UBC

WORD COUNT 1294

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Introduction

The three articles critiqued highlight a central theme: how the use of educational technologies improves learning for children; and demonstrates how appropriate methodology selection is essential to valid research. This paper summarizes, and then evaluates each article for success at providing evidence to support the use of technology in schools and examines the particular methodological approaches. Lastly, the conclusion reiterates the main ideas and suggests valid future research.

A comparison of fifth graders' frequency using web-based activities versus traditional activities for self-directed enrichment.

In her action research, Karen Hayse (2003) investigates whether internet based activities are more successful than traditional learning activities at motivating independent learning. Specifically, Hayse moderately proves that students are more motivated by web-based activities through a self-reporting ten week study in which a grade five class self-selects their independent learning activities. Gay, Mills & Airasian (2009) state that action research can 'validate and challenge existing practices' (p.486) and Hayse uses the action research process to determine if her current practice is effective. Other positive aspects of her study include: identification of controlled variables; following a clearly prescribed procedure; identifying future study opportunities which, if conducted, could validate her own action research; and outlining next steps for improving her practice. Alternatively, she neglects to state the sample size, does not define 'age appropriate activity' and results are self-reported. She also states that her hypothesis was not fully supported by her research but fails to elaborate upon this. Finally, Hayse (2003) contradicts her own study when she concludes that the students prefer hands-on, visual-spatial and social activities to textual,

solitary ones and that perhaps it is the type of activity not the mode of delivery that is more influential.

The Effects Of Incorporating Word Processor Into Three Year Writing Programme.

Natalie Beck and Tony Fetherston (2003) conduct a qualitative study using convenience sampling to compare the students' prior hand-written writing attitudes, motivation and qualitative outcomes with those after the introduction of a word processor. Their sample size was small but the ethnographic research strategy employed triangulated data collection through conducting interviews, observations, tape recordings and examination of completed writing activities. Beck and Fetherston used a variety of access points to determine that the development in student attitude and motivation, along with the quality of the students' writing, is greatly influenced by the use of a word processor. However, their methodology and analysis included outdated references, differentiation in the compared writing tasks and unstructured interviews.

Middle school students' technology practices and preferences: Re-examining gender differences.

L.M. Miller, H. Schweingruber and C.L. Bradenburg (2001) rekindle the discussion of gender and technology in their study signifying that the assumed digital divide is diminishing due to more equitable access to ICT equipment/internet connectivity. Their quantitative data collection (questionnaire) ascertained: that all students have a positive attitude towards their ICT ability and disposition for technology acquisition; most students have access to computers at home/school; and that females like different media styles and have different content preferences than males. However, there are some issues surrounding the validity of their research: outdated literature; a scope that is far too broad and an unclear selection of their sample population. They also used a methodology potentially unsuitable for

children (extensive -68 questions- pen and paper questionnaire, see Appendix 1) which could weaken the reliability of their data since many young people want to please adults {similar to the Hawthorne Effect as described by Gay et al (2009) on page 249}.

Synthesis

Overall, each of the three articles provides evidence that the use of technology in schools enhances student learning (grades 3 to 8) in a meaningful way. Each research paper proves the stated hypothesis, employs a structured methodology and utilizes a literature review in the process of reaching conclusions. Hayes shows us that students are more motivated by web-based activities than traditional pen and paper ones in her action research; Beck and Fetherston's qualitative research confirms prior research indicating that the use of word processors enhances student writing; and using a quantitative survey, Miller et al. al prove that the digital gender gap is declining due to increased accessibility of ICT in schools and that this trend is likely to continue. Although they are independent studies using varied methodologies with different goals, interesting comparisons can be made between them.

Beck and Fetherston's case study benchmarked each student using previous writing samples but they do not elaborate on how these were selected which indicates possible bias. Hayse, on the other hand, has no need for establishing a yardstick with her action research since it is research applicable to her own professional development (Gay et al., 2009) and Miller et al do not require a benchmark since they conducted a survey. Also, unlike Miller et al., the omnipresent gender factor was not raised by Beck and Fetherston or Hayse.

Beck and Fetherston evaluated potential progress using several methods (interviews, observations and standardized analytical scoring system) because writing is multidimensional. The validity of their results is improved since a qualified teacher

moderated the results. Whereas Miller et al. and Hayse could directly analyse the results of their research using statistics.

Furthermore, it is important to note that while Hayse and Beck and Fetherston have a clearly identified question and logical approach to their research, Miller et al. had a very broad scope and should have focused on how the students use ICT at school (ie. use a daily log). Additional issues regarding the scope of Miller et al.'s analysis include a superfluous comparison of: ICT to TV; advantaged students to disadvantaged students; and the use of technology independently or with support. What do these comparisons have to do with the research?

Lastly, Beck and Fetherston and Miller et al. use a wide variety (albeit outdated) of literature in their review while Hayse uses a mere three. This suggests that there is a much greater depth to the non-action research studies. Yet since each study uses a literature review to validate the purpose of their research, the individual studies support the supposition that technology can enhance learning.

Was the best methodology used for each set of research?

The methodology employed by each study (see Appendix 1 for details) used different approaches to data collection. Qualitative, quantitative and action research all have a role in quality educational research and researchers have the responsibility of selecting the methodology that will best address individual hypotheses. The action research conducted by Hayse was suitable for her purposes- to validate her classroom practice. The qualitative methodology of Beck and Fetherston provides us with a clear vision of the participants but their small sample size prevents large scale generalizations. Furthermore, Miller et al.'s quantitative questionnaire enables more comprehensive conclusions to be made due to the

large sample size but it should be chiselled down to better meet the scope of their research and increase user-friendliness. Although, the most reliable of the three is the Miller et al. survey as it uses an explicit methodology with less of a margin for error, each set of research used an appropriate methodology for their purpose.

Conclusion

So does technology enhance student learning? Yes. Although these three articles each use a different type of methodology (each illustrating some reliability issues- see Appendix 1), they do contribute to the body of research that supports the use of technology in schools to enhance student learning. These articles can individually, or in combination, provide evidence for advocating the use of technology in schools. However, this research is now outdated and additional research is needed to investigate: how to use technology effectively by gender, if technology motivates/enhances learning and how to enhance learning through technology. Furthermore, this future research should pay attention to employing the most appropriate methodology in order to yield the most accurate, reliable and compelling results.

Appendix 1: Methodology Overview

Author and Year	Hayse (2003)	Beck and Fetherston (2003)	Miller et al. (2001)
Title	**A comparison of fifth graders' frequency using web-based activities versus traditional activities for self-directed enrichment**	**The Effects Of Incorporating Word Processor Into Three Year Writing Programme.**	**Middle school students' technology practices and preferences: Re-examining gender differences.**
Question investigated	Which medium is more effective in motivating children to enrich learning independently?	Does the introduction of word processors improve student writing?	Has the digital gender gap decreased?
Focus of research	Self directed internet vs. traditional activities	Attitudes, motivation and outcomes	Self-perception of computer skills and their acquisition; exposure to technology at home; and media style and content preferences
Research type	Practical Action Research	Qualitative (ethnographic) study	Quantitative data collection in the form of a questionnaire.
Sampling type	Convenience	Convenience	Stratified
Sample size	Sample size = an entire grade 5 class (# not stated)	Sample size = seven year three students	Sample size = a diverse socio-economic population of 512 middle school students aged 11-15 (57%- female, 43% male)
Time frame	10 week study	6 week study of 45 minutes sessions every school day	6 month study
Data collection	Idiosyncratic- every third day students were given learning site time and chose from the 15 internet activities and 15 'traditional' learning activities	Conversational and standardized open-ended interview techniques, ongoing observations, anecdotal notes and tape-recordings of conversations	Survey of 68 questions for students to answer within 30 minutes
Analysis	Self-reported results tallied at the end of each day and collated by teacher at the end to analyse	Standardized marking criteria to assess the quality of written work	Standard statistics calculated to analyse results of 512 completed surveys
Validity and Reliability issues	-Students self-recording daily results -Outside factors that can influence student choices -parts of conclusion are contradictory -didn't help solve an everyday problem	-unstructured interviews -possible bias due to very subjective analysis of student work -sample size is too small -tasks are not same causing potential discrepancies in analysis	-survey is too long for child pen and paper questionnaire -time frame, why so long? -sample selection is obscure -scope is too broad

References:

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