FRONTIER CENTRE FOR PUBLIC POLICY
FRONTIER Backgrounder
BRIEF ANALYSIS

(FB054) February 2008

Computers in the Classroom:
Technology Overboard?

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Executive Summary

- The Manitoba government has identified working with information technology as "a foundation skill area to be developed in every subject area and grade."
- School divisions in Manitoba spend more than $26 million annually on information technology in schools.
- There are several reasons to be concerned about this excessive focus on computers in the classroom.
- Studies show that when factors such as household income are controlled, there is no evidence that greater access to computers at school has a positive correlation with academic achievement.
- Equipping schools with additional computers can be very expensive. Since school divisions have fixed budgets, money is often diverted from other important areas.
- While it may make sense for students in higher grades to become computer literate, the same does not hold true for those in earlier grades. Introducing computers at too young an age can have a negative effect on academic achievement.
- Not all teachers are skilled at integrating computer instruction into the regular classroom setting. Upgrading computer labs and providing students with personal laptops will be of little use unless teachers are able to effectively incorporate them into their instruction.
- The provincial government needs to develop a more balanced approach to information technology.

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Introduction

Most people accept it as a given that in order to function in the 21st century one has to be at least moderately computer literate. Computers are everywhere and an increasing number of employers expect their workers to know how to use them. Because this trend shows no signs of abating, it makes sense to do everything possible to ensure that young people entering the workforce are computer literate. As not every family in Canada has access to a computer at home, it is seen as imperative that public schools give all students the opportunity to learn how to use a computer.

However, some have argued that schools have swung too far in this direction and are introducing students to computers at a much earlier age than necessary. It has been pointed out that many of our students are too dependent upon computers and that this dependence has come at the expense of other important skills — such as reading and basic math. While computer literacy is important, it should not displace a solid education in the basics.

In addition, it is important to consider the significant costs involved in providing computers in classrooms. School divisions in Manitoba spend a considerable amount of money on computers on an annual basis. Since computers rapidly become obsolete, upgrading and replacing computer systems occurs regularly. Because of the major expense involved, schools should ensure that computers are introduced at an age when students receive the maximum benefit from the money spent.

Information Technology in Manitoba Schools

The Manitoba government identified information technology as a foundation area that needs to be developed in every subject area and grade. Information technology includes the following: computers and their peripherals, computer software, the Internet and electronic multimedia.[1] If skill in this area were developed in every subject area and grade, this would mean that students in public schools should have access to computers starting in kindergarten. This indicates that the provincial government clearly envisions an ever-increasing presence of computers in public school classrooms.

School divisions appear to have taken this mandate seriously since slightly more than $26 million is spent annually on information technology in public schools.[2] Across Canada, students now have more access to computers and the Internet than ever before. Nationwide, schools have a 5:1 ratio of students to computers and three out of four school-aged children regularly access the Internet.[3] The push to expose students to computers at younger ages will result in an increase in these numbers.

While in the past, schools provided computer education during a separate class in a specially designated computer lab, schools are now moving to integrate computers as part of regular curricular instruction.[4] This means many schools are providing multiple computers in each classroom in order to facilitate this integration of computer technology with regular instruction. As a result, information technology has become a significant part of school division budgets in Manitoba.

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[1] Manitoba Education, Citizenship, and Youth, *Technology as a Foundation Skill Area: A Journey Toward Information Technology Literacy*, 1998, http://www.edu.gov.mb.ca/ks4/docs/support/tfs/index.html

[2] Manitoba Education, Citizenship, and Youth, *FRAME 2004/2005 Report Budget*, http://www.edu.gov.mb.ca/ks4/finance/facts/index.html

[3] Sue Ferguson, "How Computers Make Our Kids Stupid," *Maclean's*, June 6, 2005.

[4] Manitoba Education, Citizenship, and Youth, *Technology as a Foundation Skill Area: A Journey Toward Information Technology Literacy*, 1998, http://www.edu.gov.mb.ca/ks4/docs/support/tfs/index.html

Reasons for Concern

The provincial government should seriously consider whether the pendulum in favour of information technology has swung too far in one direction. There are many reasons school divisions should be cautious about increasing their emphasis on information technology education in regular classrooms.

1) *Studies show that when factors such as household income are controlled, there is no evidence that greater access to computers at school has a positive correlation with academic achievement.*

University of Munich economists Thomas Fuchs and Ludger Woessmann recently published a detailed analysis of the OECD Programme for International Student Assessment (PISA) standards tests.[5] PISA is an international standardized assessment administered to fifteen-year-old students in over forty countries. Areas assessed by PISA include mathematical literacy, problem solving, reading literacy and scientific literacy.[6]

Interestingly, Fuchs and Woessmann found that when controlled for variables such as household income, students with the most access to computers at home and school had lower scores in math, reading and science than did students with less computer access. While a moderate level of computer access had a positive correlation with student achievement, excessive computer access had a negative correlation. According to Fuchs and Woessmann, the "conditional relationship between student achievement and computer and internet use at school has an inverted U-shape" — meaning that schools need to guard against making unnecessary use of computers in classrooms.[7]

A recently published study from Israel provides further evidence for the ineffectiveness of increasing the number of computers in schools. In 1994, the Israeli State Lottery sponsored the installation of a large number of computers in elementary and middle schools throughout the country. As a result, Israeli teachers reported that they significantly increased their computer-aided instruction (CAI) in the regular classroom. However, the increase in CAI did not translate into higher test scores.[8] If additional computers in schools did make a difference in student learning, one would see different results in this study.

Thus, while it may be reasonable to include a moderate amount of computer instruction in public schools, we must not delude ourselves into thinking that more computer use increases academic achievement.

2) *Equipping schools with additional computers can be very expensive. Since school divisions have fixed budgets, money is often diverted from other important areas.*

Computer technology is expensive. The $26 million spent annually on information technology in Manitoba school divisions represents almost 2 per cent of all educational expenditures in the province.[9] Unlike most other capital expenditures, computers

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[5] Thomas Fuchs and Ludger Woessmann, *Computers and Student Learning: Bivariate and Multivariate Evidence on the Availability and Use of Computers at Home and at School*, 2004, http://ideas.repec.org/p/ces/ceswps/_1321.html

[6] Program for International Student Assessment, http://www.pisa.oecd.org/pages/0,2966,en_32252351_32235731_1_1_1_1_1,00.html

[7] Fuchs and Woessmann, *op. cit.*

[8] Joshua Angrist and Victor Lavy, "New Evidence on Classroom Computers and Pupil Learning," *The Economic Journal*, Volume 112 Issue 482 Page 735 - October 2002, http://www.blackwell-synergy.com/doi/abs/10.1111/1468-0297.00068

[9] Manitoba Education, Citizenship, and Youth, *FRAME 2004/2005 Report Budget*, http://www.edu.gov.mb.ca/ks4/finance/facts/index.html

depreciate rapidly. It does not take long for computers purchased today to become obsolete. Obviously, if schools endeavour to provide a computer for each student, computer expenses can be expected to increase substantially on an annual basis. This money could be put to better use in other areas such as purchasing textbooks and upgrading school buildings.

3) *While it may make sense for students in higher grades to become computer literate, the same does not hold true for those in earlier grades. Introducing computers at too young an age can have a negative effect on academic achievement.*

Students in the early and middle years do not need to use computers to the same degree as those in the senior years. Thomas Fuchs, co-author of the previously mentioned study that showed a negative correlation between computer access and academic achievement, speculated that young children are even more damaged by excessive computer access than are the 15 year olds he tested as part of the PISA study.[10] Since computer use often reduces pupil-teacher interaction, this could have a negative impact on literacy since the learning of reading requires extensive interaction between students and teachers.[11]

In addition, since computer hardware and software rapidly become obsolete, it is difficult to see how requiring young students to become familiar with software that will be obsolete by the time they reach high school is beneficial to their academic learning. Their time would be better spent getting a solid grasp of the basics — such as reading and mathematics. If students have access to computers at school in grade 9, they will have plenty of time to become fully computer literate by the time they graduate from high school.

4) *Not all teachers are skilled at integrating computer instruction into the regular classroom. Upgrading computer labs and providing students with personal laptops will be of little use if teachers are unable to effectively incorporate them into their instruction.*

It should be noted that computer technology is simply a tool and is only useful if teachers know how to use it effectively. Not all teachers are equally computer literate and, considering the large number of teachers who are nearing retirement age,[12] it is to be expected that many of them are not skilled at computer technology instruction. Unfortunately, school divisions often deal with this problem superficially by bringing in outside experts to provide daylong sessions on specific software programs. This is a woefully inadequate way to address this problem since people who are computer illiterate cannot become skilled computer users in a couple of prepackaged, daylong sessions.[13] As a result, school divisions need to spend more time ensuring that staff members are fully computer literate before purchasing expensive computer systems for their students.

Conclusion

It is evident that the Manitoba government needs to seriously rethink its emphasis on information technology. While it is important for high school graduates to be computer literate, this does not translate into requiring students in grade 1 to make regular use of computers in the classroom. In fact, studies show that students with the most access to

[10] Sue Ferguson, *op. cit.*
[11] *Ibid.*
[12] Manitoba Teachers' Society, *The Teaching Force in Manitoba: Recruitment and Retention*, January 2002, http://www.mbteach.org/recruit.htm
[13] Judith M. Newman, *A Garden Path? Information Technology and Education*, 2003, http://www.lupinworks.com/autobio/writing/garden.html

computers at home and school have lower test scores than those who have less access to computers. Many of these researchers believe that younger students are even more negatively affected by excessive computer exposure than are those in higher grades.

In addition, computer technology is very expensive and school divisions already spend more than $26 million per year in this area. Because computers rapidly become obsolete, it is costly to keep school computer labs up to date. It would be more effective for computer instruction to take place at the high school level rather than beginning at the early or middle levels. This way, teachers at the younger grade levels would be able to focus on providing a solid grounding in the basics so that their students are prepared for high school.

Students need to learn how to operate computers. However, the province needs to implement a more balanced information technology strategy in order to ensure that schools maintain a proper balance in this area. Information technology is *not* "a foundation skill area to be developed in every subject area and grade."[14]

About the Author

Michael C. Zwaagstra has a B.Ed., a Post-Bachelor's Certificate in Education, and an M.Ed. in Educational Administration from the University of Manitoba. During his studies, he received numerous academic awards, including the Dr. A. W. Hogg Undergraduate Scholarship, the Klieforth Prize in American History, the Schoolmasters' Wives Association Scholarship, and the Aaron Bricker Memorial Scholarship. At present he is a high school social studies teacher in Manitoba. He has written a number of policy papers on Canadian education for the Frontier Centre for Public Policy in Winnipeg and the Atlantic Institute for Market Studies in Halifax. He is also a city councillor in Steinbach, Manitoba.

[14] Manitoba Education, Citizenship, and Youth, *Technology as a Foundation Skill Area: A Journey Toward Information Technology Literacy*, 1998, http://www.edu.gov.mb.ca/ks4/docs/support/tfs/index.html

