

THE CHALLENGES AND TRIUMPHS OF A SCHOOL WITH A NOTEBOOK COMPUTER PER STUDENT

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Since 1990, I have been fortunate enough to be associated with a school, Methodist Ladies' College (MLC), deeply committed to making the potential of computers personal and transparent throughout the learning environment for both teachers and learners. By January 1993, over 1,500 students and teachers at MLC will own their own notebook computers.¹ This fact not only challenges the status quo of computers in schools, but creates new and profound opportunities for the teaching staff at MLC. Schools often take computers so seriously (i.e. ... hiring special computer teachers, scheduling times at which students may use a computer) that they trivialize their potential as personal objects to think with. Computers are ubiquitous and personal throughout society, just not in schools.

The laptop initiative inspired by Liddy Nevile and MLC Principal, David Loader, was never viewed as a traditional educational research experiment where neither success or failure mattered much. Personal computing was part of the school's commitment to creating a nurturing learning culture. Steps were taken to ensure that teachers were supported in their own learning by catering to a wide range of learning styles, experiences, and interests.

Although educational change is considered to occur at a geologically slow pace, the MLC community (parents, teachers, students, administrators) has immersed itself in some areas of profound growth in just a few short years. The introduction of large numbers of personal computers has served as one catalyst for this "intellectual growth spurt."

Teachers in many schools rightfully view the computer with suspicion as just one more mandated fad or as a threat to their professionalism as large Orwellian teaching systems are unloaded on the market place. The national average of students to computers in the United States is nineteen to one. The state of Florida has announced that it will spend \$17 million(US) this year to rewire schools in order to make way for computers.² \$17 million could buy 20,000 students their own notebook computer. Schools routinely spend a fortune building fortresses, called computer labs complete with special furniture. The personal computing experience at MLC has been different and given the changes that have accompanied classroom computer use, this initiative would have been cheap at twice the price.

The act of asking every parent to purchase a notebook computer for their child was not nearly as courageous or challenging as the way in which MLC has chosen to use computers. The quaint idea of drilling discrete facts into kids' heads with computer-assisted instruction was dismissed and so was the metaphor of the "computer as tool." The popular tool metaphor is based on the business paradigm of increasing productivity and efficiency. I would argue that there is seldom an occasion in school when the goal needs to be increasing a student's efficiency. MLC has chosen to guide its thinking about personal computing by the ideas of "constructionism" and by viewing the computer as material.³ Constructionism is the idea of Jean Piaget and extended by Seymour Papert to mean that learning is active and occurs when an individual finds herself in a meaningful context for making connections between fragments of knowledge, the present

situation, and past experiences. The person constructs her own knowledge by assembling personally significant mental models. Therefore you learn in a vibrant social context in which individuals have the opportunity to share ideas, collaborate, make things, and have meaningful experiences. After the first year of using laptops, the year seven and eight humanities teachers asked for history, English, geography, and religious education to be taught in an interdisciplinary three-period block. This scheduling modification allowed for students to engage in substantive projects.

The computer as material metaphor is based on the belief that children and teachers are naturally talented at making things. The computer should be seen as an intellectual laboratory and vehicle for self-expression—an integral part of the learning process. In this context a gifted computer-using teacher is not one who can recite a reference manual, but one who can heat-up a body of content when it comes in contact with the interests and experiences of the child. This teacher recognizes when it might be appropriate to involve the computer in the learning process and allows the student to mold this personal computer space into a personal expression of the subject matter.

Teachers at MLC were introduced to computers by being challenged to reflect on their own learning while solving problems of personal significance in the software environment, LogoWriter—the software the students would be using. I would argue that educational progress comes when a teacher is able to see how the particular innovation benefits a group of learners. These teachers come to respect the learning processes of their students by experiencing the same sort of challenges and joy. The teacher and learner in such a culture are often one-in-the-same.

LogoWriter is a popular software package that combines the power of the Logo programming language with word processing, graphics, animation, and music in one user-friendly environment. Five year olds and university professors experience the same playful enthusiasm towards problem solving and learning when working with LogoWriter. The learner is free to express himself in unlimited ways—not bound by the limits of the curriculum or artificial (school) boundaries between subject areas.

Students at MLC have used LogoWriter across the curriculum in numerous and varied ways. A student designing a hieroglyphic word processor, a longitudinal rain data grapher, or olympic games simulation must come in contact with many mathematical concepts including randomness, decimals, percent, sequencing, cartesian coordinate geometry, functions, visual representations of data, linear measurement, and orientation, while focusing on a history topic. A year-six girl was free to explore the concept of orbiting planets by designing a visual race between the planets on the screen. Fantastic examples of student work abound.

Two particular projects by MLC students warrant attention because of the ways in which they challenge us to rethink the organization of schools. Year seven students were assigned the task of designing a LogoWriter program to solve a linear equation, such as $3X + 4 = 16$. While such a task is typically too advanced for year seven students, the girls at MLC have much gained mathematical experience through their computer use and are therefore capable of solving such problems. One girl went well beyond the assignment of solving the equation by not only writing a computer program to solve similar equations—she created an elaborate cartoon of a girl

walking into her bedroom, complaining to her mother about her difficult math homework, and then a magical computer appeared and showed the user how to use the equation solving program. The student extended the typical dry algebra assignment with great joy by demonstrating her creative art and communications abilities. Another student's linear equation solving program included the playing of a complete Mozart sonata. Every note of the sonata had to be programmed in a way the computer understands. The mathematical experiences of both students were greatly enhanced because their computing environment allowed them to express their mathematical knowledge in their own voice. There is great hope for schools when student's interests and experiences are encouraged to converge with the teacher's curriculum.

The last example I wish to share illuminates how teachers have been forced to reflect on their role in the learning process and take action based on observations of student learning in the computer-rich environment. The French teachers at MLC were provided with a French language version of LogoWriter. It was originally thought that their students might find it interesting to "speak" to the computer in another language. One French teacher was intrigued by the idea, but did not know anything about LogoWriter. She felt comfortable asking a math teacher for help—this type of professional collaboration is now commonplace at MLC. The math department offered some year eight girls the opportunity to do their math assignments, not only on the computer, but in French. Students in several classes were intrigued by the challenge. A math teacher asked his colleague how to say a few phrases in French so that they could leave comments in French on their students' projects. This teacher's demonstrable respect for his student's work and colleague's subject area is exceptional.

A few weeks passed before the French teacher visited the math class. The teacher was not only pleased to observe the students learning mathematics, computer programming, and French, but was ecstatic to find that the girls spontaneously speaking French. This veteran teacher later reported that she had never witnessed students of this age actually speaking French outside of a French class lesson. In the LogoWriter environment language is active—the computer does something if you combine words in the right or wrong way and you receive immediate feedback. This experience has caused a small group of teachers from a variety of disciplines to propose that the school allow them to create a French immersion class in the junior secondary school. Teachers who have not used much French since university are so excited by the learning of their students that they are willing to practice the language along-side the students they are teaching. This sort of professional risk-taking is more common in constructionist environments than in traditional school settings. Risk-taking is an essential element of self-esteem and a critical characteristic of great teachers.

Responsible schools should challenge the status quo and computer literacy dogma by de-emphasizing computers and reasserting that the learner be central in the learning process. Used appropriately, computer technology can assist adults in making schools more vibrant, relevant, and humane while students embark on the joyous path of lifetime learning.

BIBLIOGRAPHY

Franz, S. & S. Papert (1988), "Computer as Material: Messing About with Time," *Columbia Teachers College Record*.

Loader, D. & L. Nevile (1991), "Educational Computing: Resourcing the Future," *IARTV Occasional Paper*. Jolimont, Australia: September, 1991.

Solomon, C. & S. Papert (1972) "Twenty Things to Do With a Computer," *Educational Technology*.

Footnotes:

¹ By 1994, all students in grades 4-12 will have a notebook computer - making the ratio > 1 computer/student

² Electronic Learning Magazine - September, 1992

³ Franz, S. & S. Papert (1988), "Computer as Material: Messing About with Time," *Columbia Teachers College Record*.

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Stager, G. S. (1993). **The Challenges and Triumphs of a School with a Notebook Computer Per Student.** In Estes, N., & Thomas, M. (Eds.), *Rethinking the roles of technology in education: The tenth international conference on technology and education, Massachusetts Institute of Technology, March 1993* (pp. 521–523). Austin, Texas: The University of Texas at Austin, College of Education.
