

Behind closed doors

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Photo: Dawn Anderson

Les élèves du secondaire doivent se rendre compte que l'étude des mathématiques et des sciences peut les aider à trouver un emploi lorsqu'ils/elles entreront sur le marché du travail. Lors d'un sondage récent, seulement un tiers des élèves interrogés prévoyaient une carrière dans ce domaine. En général les filles, conditionnées par la société, pensent que

les mathématiques et les sciences sont des matières difficiles à assimiler. Pourtant les recherches faites sur ce sujet montrent que femmes et hommes ont les mêmes aptitudes. Ce sont les enseignants qui doivent encourager les filles à étudier les sciences.

As a high-school student walks

down the long institutional corridors, he or she might catch sight of a new poster on the wall — a poster heralding the advent of the 80s. This colourful piece of blue and yellow paper, with its circle-within-circle motif, announces to those who care to read it that there are 82 or more jobs that will be closed to students who do not study math-

ematics or science in high school. The circles demonstrate the mathematics- and science-related fields that require a solid grounding in these subjects. The poster is an attempt by the Board of Education to make students aware of what has become a problem within the school system. Those students who do not study maths or science may not be able to find a job for themselves in the future. But are students reading the "signs" on the wall? More particularly, are female students reading these signs and acting on them?

Medicine, computer programming, the communication industry, environmental studies, scientific research, engineering, finance, management, accounting, and other related fields will remain behind closed doors to students who opt for an arts education today. These maths/science careers are the growth fields, the power positions of the future. If females expect to be well represented in the higher income careers and in positions of power and influence, they must have a mathematical and scientific background.

For a closer look at how students are responding to course selections and future job choices, a pilot project was carried out in one of the high schools in Toronto. The school was selected because a large percentage of its student population continues on to some form of higher education, and from this segment, those who are career oriented usually appear. What careers are these students choosing? Do they include mathematics and/or science in their curriculum of study? Which subject(s) do they perceive as their strongest? Which do they feel are their weakest? Are there any subjects that they feel too difficult for them? Last, but not possible the most crucial feature of the study, is there any difference in perceptions and subject choice between the male and female students surveyed?

Grade 11 and 12 students were polled, and some very alarming differences appeared between the sexes. While 80 per cent of all those surveyed, both male and female, are planning to continue their edu-

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cation past grade 13, here the similarities between the sexes end. In the male segment of the population, 60 per cent planned on a career in a mathematics- or science-related field; only 33 per cent of the female population planned careers in these fields. This percentage actually decreased in grade 12 for females to 26.6 per cent. If this trend continues, the numbers of females entering science faculties will remain shockingly low, leading to a disproportionate representation in the scientific community in Canada. Both politically and economically, the results of low representation in these fields will be drastic. Increasing dependence on technology, and computers in particular, have insured a massive decrease in the traditional office and clerical staff jobs in the future. It has been estimated that by the 1990s there will be a 35 per cent decrease in jobs such as tellers, secretaries, telephone operators, and clerical employees. These positions have been peopled predominantly by women. With an increasing need for two incomes per family and the subsequent decrease in these "traditional" jobs, other choices will have to be made by women.

The potential growth areas in the economic sector are in the science-related fields. These fields need female representation, not only because these fields will have the employment potential which women so desperately need, but also because science and technology have been reshaping our lives; women must be a part of this reshaping process in order to contribute to our future technological society. From the microwave oven to computerized banking, video systems to test-tube babies, "we've come a long way. . ." Without ade-

quate numbers in the scientific fields we, as women, will lose the voice we fought so hard to have heard.

Our students' visions of their future and what is possible become one of Canada's greatest assets. If their visions are narrow and they perceive difficulties which they cannot overcome, so too Canada's future will be narrow and marred. The most common career choices made by the female population surveyed were those in broadcasting, journalism, and music.

Choices are governed by the student's view of his or her abilities. Only 33.3 per cent of the females surveyed felt that a mathematics or science subject was their best subject, while 80 percent of the male population chose mathematics, chemistry, or physics as their best subject. When asked to list their weakest subject, the one that gave them the most difficulty, 53.3 per cent of the young women in grades 11 and 12 chose a math or science subject. Biology was never cited as a problem; mathematics, physics, and then chemistry were the difficult areas. A mere 13.3 per cent of the male population felt that mathematics or science subjects were their weakest ones. Over half the female students, it would appear, suffer from "mathephobia" or its equivalent, "science phobia."

The final question asked by the survey elicited the widest disparate responses between the sexes and is possibly the one that should produce the most concern among parents, educators, and guidance counsellors. When asked if there were any subject that the student though he or she could not master, not one male listed a math or science subject, while 26.6 per cent of the females in grade 11 and double that, 46.6 per cent in grade 12, thought that they were unable to grasp a math or science subject. The subject most cited as too difficult was mathematics, but physics ran a close second, followed by chemistry. What is happening to these girls? What has convinced them that they do not have the ability to grasp these subjects even at the most rudimentary high-school level?

One might be tempted to fall into the familiar response that females are less capable than males of dealing with abstract thought, concepts, and spatial perceptions. Our brains are better suited to handle language, arts, poetry, the creative and emotional side of life. Men are better equipped to deal with abstract thought, reasoning, spatial perception. These are the beliefs that have permeated our society. These are the myths that must be expelled before our students' perceptions of their abilities will change.

Scientific research into the area of sex-linked differences in intellectual ability has been contradictory and for the most part inconclusive. Three of these theories are discussed in the publication *Who Turns the Wheel?*, the result of proceedings of a one-day workshop held by the Science Council of Canada. In an article entitled "Sex Differences in Intellectual Ability," based on a presentation by Dr. M. Kimball of Simon Fraser University, the X-linked hypothesis, the role of hormones in the development of abilities, and the brain lateralization theory were analyzed.

The X-linked hypothesis postulates that a recessive gene carried on the X-chromosome is responsible for high mathematical ability, but the conclusion is that there is "... no evidence to support the notion that mathematical ability is a single all-or-nothing kind of characteristic which an individual either inherits (and then develops) or does not inherit." The theory that hormones are responsible for increased cognitive ability is still fraught with contradictions. Increasing attention has been focussed on the brain lateralization theory. This theory states that the two hemispheres of the brain are specialized; the left deals with verbal ability, analysis, and abstractions, while the right hemisphere synthesizes, intuitively, and is responsible for spatial-visual performance.

Two Queens' University psychologists, Dr. James Inglis and Dr. J.S. Lawson, have been studying left- and right-brain damaged men and women. They have found that men suffering from left-hemisphere damage show a decrease in verbal

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ability. Those suffering from right-hemisphere damage display a loss in performance function. Left-brain damaged women, however, incurred a loss in both areas. Right-brain damaged women are unaffected. From these experiments it would appear that for women there is a greater dependence on the left hemisphere for all functions than is the case for men. There is no agreement as to when the process of lateralization occurs: the variance is from age five to twenty-five. There is also no agreement as to whether lateralization, the specialization of the hemispheres, or bilateralization (the use of both hemispheres) is more conducive to improved spatial functioning. It is one thing to prove lateralization occurs in women and another to conclude spatial perceptions are impaired by this specialization. As Dr. Inglis warns, it would be dangerous to conclude that the differences can be attributed to a biological difference between men and women.

Studies in other countries have indicated environment acts as a strong determining feature in how the brain evolves. For example, Japanese girls were found to have higher physics scores than boys in ten other countries studied. Further, a Japanese scientist comparing Japanese speakers with American speakers found that the verbal processing function took place in different parts of the brain for each of these cultural groups.

Since there is no concrete evidence to support a preference for lateralization over bilateralization or that lateralization is a function of biological traits, there seems to be little reason to suggest heightened male ability in the area of spatial functioning due to increased bilateralization.

If there is no scientific evidence to suggest that women lack abilities

in spatial performance, we must not explain female perception of lack of ability in maths or science fields in biological terms. We must consider environmental factors and societal attitudes. The female students surveyed who cited mathematics, physics, or chemistry as beyond their abilities must somehow have their confidence restored. Since the environment plays a significant part in conditioning these students' perceptions, the lack of role models in the scientific community, both within the school system itself and in the community at large, may have a detrimental effect on these students. (At the school surveyed, there were no female science teachers and only one female mathematics teacher!) This situation cannot change unless we attract more women into the scientific fields. Their perceptions must be altered if they are to succeed in these fields in the future. The "boys excel in maths, girls are competent in languages" philosophy must be dispelled. The parents who explain that engineering is too difficult a field for their daughter to enter must become aware of doors they are closing for their child. The teacher or guidance counsellor who directly or indirectly presents scientific research or medicine as a male-dominated area of endeavour does our society a gross disservice. Peers who tease, the press which portrays women in nontraditional roles as odd, these groups further aggravate the problem.

In all-female school systems with all-female teachers, girls perform significantly better in both mathematics and science. Educators are presently theorizing that one possible solution to the female maths/science drop-out revolution might be all-female mathematics courses taught by women. This solution might be one way around the sex stereotyping and peer pressure produced from such images as the "female math brain," the young woman who sits at the front of the class, gets 100 per cent on her tests, but never has a weekend date. But this must only be an initial solution. Integration of the sexes and full equality in all possible human endeavours must surely be our aim.

If we must separate in order to narrow the gap, then so it must be, but only as long as is necessary. An extended separation can only point to further differences rather than to similarities.

Meanwhile we can only hope that those students in our high schools will read the "writing on the wall," notice the posters placed there for view, and receive constructive guidance from the rest of society to help them open those closed doors.

Suggested Reading:

Science Council of Canada,
100 Metcalfe Street, Ottawa
K1P 5M1

Who Turns the Wheel? (1982)

Birth of a Feminist

I am tired of waiting
for men who say they're
going to come at four,
but don't make it until six.
Even the spinach plant has
better timing than that
and it don't taste so good
right at the first bite.

I am tired of waiting for
letters
from men who get delayed
by drop-in visitors,
or swing-shift work,
or any other Goddamn thing,
which stops them writing
to me.

I am tired.

I am ready to grow.

Vancy Kasper

Service non-compris

On blues la table mouillée d'un bar. Centre-vil
ébété de jambes mouvantes du trop-tard. Pas de
cendrillons dans les clubs. Après minuit elles
ont la tête engourdie des citrouilles. En pantalons
racleurs elles escarpent les pistes denses
les mollets crampés de musique et de rouge à
lèvres. Aux bouts des drinks exotiques elles ont
le poli à l'ongle comme un rubis sûr et elles se
grattent sans s'égratigner sans s'abîmer.

L'habitude quoi! A grands coups de fossiles elles
dégagent leur pupille enflammée d'hypnotisme
charmeur. La gorge bien soutenue par le bras fier
elles ont le corps sage malgré les transparences
des décolletés. Il ne faut jamais se fier aux
transparences. Elles s'appuient et s'alignent
au comptoir cherchant discrètement une jungle
thoracique à laquelle se pendre. Mais à ces
heures les lianes sont déjà moins solides. Les
verres aussi se croient à l'épreuve des pires
brosses jusqu'à ce qu'on leur déplace la raie.
Les aiguilles des horloges s'égarent et celles
des talons s'affirment moins bien. Last call,
dernier service.

Micheline Sylvestre