Mathematics activities that address social issues

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The study of mathematics is important not only to master basic numerical skills, but also to understand and interpret economic, political and social information.

Social issues affect everyone but they are often not discussed directly, as people are unsure of accurate details or of the relationships between various factors. The classroom is a safe place where an informed teacher can address important social issues with students, helping them to better understand their world. Such discussions do not have to be limited to social studies classes. In fact, math classes lend themselves beautifully to the study of social issues and their causes. The Statistics Canada website is a useful tool for mathematics educators as it provides easily accessible data on a variety of topics. Using real data and real situations in teaching mathematics is a valuable way to generate students' interest and help them grow as individuals.

The following activities are examples of how to introduce social issues into a Grade 9 math class that is studying linear relationships. These activities build on and emphasise skills covered in the linear relationships strand of the curriculum. They are technology-based activities that use the Statistics Canada website as a source of information. Due to their self-contained structure, they may be used as class activities that lead into group discussions, or as individual work tools for independent practice or extension activities.

Teachers can and should modify these activities to best suit the needs of their class. Students can work through them independently and be challenged to think about the issues, while learning appropriate skills in class. Depending on the teacher's comfort level with the topic, an activity can be used to inform students (or to have them inform themselves) about the facts surrounding an issue. Through class discussion, the students may then look deeper into the issue, its causes and its potential solutions.

Smoking Statistics

According to Statistics Canada, young men between the ages of 20 and 24 have the highest smoking rates of any group in Canada.

• Go to www.statcan.ca and choose *Canadian Statistics/Health/Determinants/Smokers by sex*. Look at the data for the percentage of males and females in different age groups that smoke. What can you infer by looking at this data table?

• Draw a graph by hand of the percentage of males that smoke in each age group. Is this a linear graph? What does the graph tell us? Could we use this graph to make predictions? (Repeat for the female smoking statistics.)

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• Graph the male and female smoking statistics on the same set of axes. How does this graph help us compare the two sets of data? What does the graph tell us?

• Use either TI Interactive or Excel to make the graphs described above. Change the parameters (axes, labelling, etc.) so that the technology-generated graph looks like your hand-drawn graph.

• Identify the group(s) of people who are most likely to take up smoking. Outline a plan for an anti-smoking campaign targeted at these specific groups. Be sure to look up reasons why people should not start smoking.

Include statistical evidence (such as the average number of deaths related to smoking) that could deter people from smoking. Search for articles on smoking in *The Daily*, by going to www.statcan.ca and choosing *The Daily/ Search The Daily*.

The activity outlined above is a good introduction to the Statistics Canada website and to the use of technology for making graphs. Linking hand-drawn graphs to computer-generated graphs is vital for students to understand how information is actually represented and to be able to interpret computer-generated graphs in the future. The data table for this activity is straightforward and easily used to introduce data interpretation. Through the summative task, students draw conclusions from the interpretation they have just completed. They also become more familiar with the Statistics Canada site as they look for statistical evidence to support their anti-smoking campaign.

This activity would work well as a class activity, perhaps done in pairs. It would also work as an independent activity, providing students have basic computer skills. It may increase student's interest in math and graphing because making decisions about smoking is something they can all relate to.

Equality in the workplace

Statistics on wages in Canada reveal that on average, women earn 64 cents for every dollar that men earn for equal work.

• Find the average earnings for men and women over the past ten years by going to www.statcan.ca and choosing *Canadian statistics/Labour, employment and unemployment/Earnings/Average earnings by sex and work pattern*.

• Graph the average earnings for women since 1990 and the average earnings for men since 1990 on separate graphs using TI Interactive or Microsoft Excel. Then graph the average earnings for both men and women on the same

graph. What do you notice about the slope of the lines? What does the slope of these lines tell you about the change in earnings over time? Why do you think there is a difference between the earnings of men and women?

• Predict what the difference between the average earnings of men and women will be in the year 2010 and in the year 2025.

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This learning activity can be used as an independent question sheet. Or as part of a larger lesson, it can introduce a classroom discussion on gender equity. Students are required to generate and interpret graphs, make predictions from graphs and also think about the reasons for the gender wage gap.

Even without teacher-guided discussion, using real statistics to unveil a controversial issue will generate interest in the activity and raise awareness.

Life Expectancy

Life expectancy at birth is a key indicator of a population's health status. The life expectancy of females is generally significantly longer than that of males in any given year.

• Look at the data for life expectancy for each province by going to www.statcan.ca and choosing *Canadian statistics/Health/Status/Life expectancy at birth by sex, Canada, provinces.* This data table gives life expectancies from 1920-22 to 1990-92. You can obtain more recent data in E-STAT, in table #102-0025 of the CANSIM II database. Go to www.statcan.ca, *Learning Resources/ E-STAT/Accept and enter/Search CANSIM II/Table number/Enter table #102-0025.* When you reach the output format menu, select "HTML table".

• Using the data for the most recent year you have, plot the life expectancy for males and females for each province in Canada on the same graph. Are there any large differences? What do you think could account for the differences and similarities you see?

• Plot the life expectancy in Canada throughout the twentieth century, for males and females on the same graph. What do you notice about the slopes of the lines? What does the graph tell you about life expectancies over time? What may account for the changes?

• To compare life expectancies in different European countries and Mexico, consult the *International Comparisons* table in the Statistics Canada brochure *Canada at a Glance,* available at www.statcan.ca, *Canadian statistics, (scroll down), Canada at a Glance.* To find statistics for more countries, consult the UN Statistics Division at http://unstats.un.org/unsd, *Demographic, Social and Housing/ Social indicators/Health* or http:// unstats.un.org/unsd/demographic/ social/health.htm.

• On the same graph, plot the life expectancies of males born in Canada and in a few other countries you have chosen. Then plot the life expectancies of females in these countries on the same graph. What similarities and differences do you see? What does this tell you? What may account for these similarities and differences? Do you think different countries need to have different life expectancies? Write a paragraph explaining why some countries have lower life expectancies and what you think Canada could do to help these countries improve their population's health.

This activity helps students look at their province and country in a global context. It reinforces skills in graph creation and interpretation. It challenges students to think about how changes in the variables over time account for changes in the graph. Comparing life expectancies in Canada with those in developing countries may uncover certain social and economic issues, encouraging students to think beyond their immediate surroundings. As an extension to this activity, students could graphically analyse the relationships between life expectancy and different related variables, such as average levels of income or food consumption.

The ideal enrichment activity for the entire class would be for each student to identify a social issue and investigate its incidence and causes using data from the Statistics Canada website. Students can propose solutions, create presentations and lead class discussions.

Students may also consider the way data was collected by looking at the survey information available at www.statcan.ca, *Statistical methods/ Surveys.* This would reinforce classroom learning about the characteristics of a good survey (for example, defining the survey population and sample).

Once students have developed the skills to use the Statistics Canada website effectively and to create and interpret graphs, applying these skills to real data will engage their interest and enhance their learning. ✦

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