The Newspaper Wedge: Motivate Students to Solve and Create Problems

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Motivation is a daily problem for teachers who want their students to be active learners, especially with the competition of television, rock video, space exploration, and so forth. The problem is perhaps more severe with the learning of mathematics and, in particular, with problem solving. Students will have more desire and expend greater effort in the solution of problems that they can relate to their real-life experiences than most of those found in textbooks.

Teachers need to be alert to events that appeal to students and which can be used as a realistic context for learning. Newspaper reports, advertisements, sports news, travel information, financial pages, and even the comic strips can help teachers to motivate students and can serve as a vehicle for interesting problem-solving activities. Such problems can provide opportunities for a variety of solutions and stimulate additional related problems. Even more important, discussions about methods of solutions and the solutions themselves are more likely to generate new ideas and enable students to approach other problems with more confidence.

Current Events Context

Consider, for example, an event such as Steve Fonyo's "Journey for Lives" across Canada. One newspaper report gave the following information about Fonyo:

> **His daily 32-kilometre distance is marked by a series of orange cones placed at one-kilometre intervals.* Between one set of two cones, he took 1,179 steps. At that rate, how many steps will he have taken on his 7,320-kilometre cross-Canada journey?**

This bit of information can be used to devise interesting mathematics activities and problem-solving situations for students, who are likely to show more interest and effort because of their knowledge, awareness, and admiration of a young Canadian hero. Children will be eager to solve the problem suggested by the news item. It is preferable to have students compute the answer with a calculator after they have determined that the product of 1,179 and 7,320 will provide the answer. This problem becomes a lead-in to several other interesting problems, such as the following.

1. **How many steps do *you* take to walk a kilometre?**

This is a good problem situation in which there are no numbers. The first thing that must be determined is what information is needed. Next, how will the information be obtained? These conditions make the problem more realistic than the standard textbook variety.

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*The actual report had the cones at one-mile intervals. The number of steps has been adjusted for one-kilometre intervals.

It is an excellent situation in which to involve the class in a discussion of how such a problem might be solved for each individual student. In such a discussion, teachers can expect some impractical suggestions amid some unusual and productive ones, but no suggestion should be dismissed without allowing the student to see why the idea may not be helpful. Sometimes, when that opportunity is given, a seemingly unproductive idea actually turns out to be a brilliant one. Class discussions that encourage students to speak without threat of embarrassment may do much to encourage confidence and persistence in problem solving, instead of frustration and futility.

It is my belief that if you try out such a discussion with the above or similar problems, you will reap a harvest of more interesting ideas than you expect. Eventually, the discussion will conclude with an agreement that, in order to solve the problem, each student must find the length of his step, or pace. Further discussion will result in decisions on methods and materials to be used for determining pace length. When each student's pace length has been determined, there are several ways in which the problem might be solved.

Determination of Pace Length

Method 1. Have students work in pairs. One student should take a few steps and then freeze in position. The other student should use a metric tape to measure the distance from toe to toe or heel to heel.

Method 2. Have the class work outdoors. Working in pairs, one student starts from a marker, walks 10 steps, stops, and marks the terminal spot. The two students use a long metric tape to measure the distance. The pace length is determined by dividing the distance by 10.

Solving the Problem

Using a pace length of 40 centimetres:

Method 1. There are 1,000 metres in a kilometre. We also know there are 100 centimetres in a metre. Convert 1,000 metres to 1,000 X 100, or 100,000 centimetres. Divide 100,000 by 40. The number of paces = 2,500.

Method 2. Convert 40 centimetres to 0.4 metres. Divide 1,000 by 0.4 to get 2,500.

Method 3. Make a table:

Steps	Distance
10	4 metres
100	40 metres
1,000	400 metres
2,000	800 metres

Note that with 2,000 steps, you would travel 800 metres, leaving only 200 metres more to go. Note also that with 1,000 steps, you travel 400 metres. Then, to cover 200 metres more, you need 500 more steps, or a total of 2,500.

Method 4. Guess and test. The goal is to walk 1,000 metres, or 100,000 centimetres.

FIRST GUESS: 1,000 steps.
This takes you 1,000 X 40 centimetres, or 40,000 centimetres. This is much too small.

SECOND GUESS: 2,000 steps.
This takes you 2,000 X 40 centimetres, or 80,000 centimetres. This is much closer to our goal.

THIRD GUESS: 2,500 steps.
This takes you 2,500 X 40 centimetres, or 100,000 centimetres. That's just right.

These various solutions are given to show that there are many ways of looking at a problem, any one of which may fit a student's learning style better than a preconceived conventional solution. Teachers who invite such a variety of solutions will find that students will be more successful and more positive in their problem-solving behavior.

The above was a detailed discussion of just one problem. Solving such a problem may actually whet the appetites of students for additional related problems, such as the following:

2. If you take 1,850 steps to walk to school, about how far is your home from school?
3. How many steps would you take to *run* one kilometre? (Is your pace length for walking the same as for running?)
4. A marathon distance is about 42 kilometres. About how many steps would you take to walk that distance?
5. The distance around the earth at the equator is about 40,000 kilometres. About how many steps would you have to take to go that distance?

After problems like this, you may find that your students wish to create problems of their own. Such problems might be created individually or in groups for a "best problem of the day" contest.

Advertisement Context

Advertisements offer many opportunities for motivating students. How many different problems could your students construct and solve using the information shown in the ad at the bottom of this page? Here are a few examples:

1. How far would the Mercedes Benz 190 E 2.3 go in 24 hours?
2. How long would it take the car to go across Canada?
3. How much fuel would the car use in one hour?
4. How long would it take the car to travel 50,000 kilometres? Could this be done in eight days and nights?
5. How much fuel was used to travel 50,000 kilometres?
6. The world's fastest human can run 100 metres in 10 seconds. How far would the Mercedes Benz travel in 10 seconds?

Some of the above problems have insufficient information. Such problems provide an excellent basis for developing ideas about the problem conditions and estimation skills. For example, the question about fuel consumption at 248 kilometres per hour compared to consumption at 100 kilometres per hour should be discussed.

For students who are interested in things other than automobiles, numerous other ads will provide them with interesting and challenging problem situations.

In the past nine years, Mercedes-Benz has raced the clock four times—and set forty-one international records.

ON A TRACK IN NARDO, ITALY, on a sweltering August day, a 16-valve four-cylinder Mercedes-Benz 190 E 2.3 crosses its mark at 248 kilometres an hour. A cheer goes up from the gathered technicians.

Not because the car is traveling at 248 kilometres an hour.

Because the car has been *averaging* 248 kilometres an hour for eight days and nights.

Comic Strip Context

The comic strip illustrated at the bottom of this page provides another example of a situation which can be a highly motivating instrument for the construction of problems by students. The task is to formulate problems for which the answer is 11 potatoes.

Here are a few examples, although your students will likely invent more interesting ones:

1. For lunch, I ate four potatoes, and for dinner, I ate seven potatoes. How many potatoes did I eat altogether?
2. There were 24 potatoes in a bag. My mother cooked 13 of them. How many were left?
3. Polly filled five bags with 55 potatoes. Each bad contained the same number of potatoes. How many were in each bag?
4. On Sunday, Mike ate one potato. He ate three potatoes on Monday, five potatoes on Tuesday, and seven potatoes on Wednesday. If he continues this pattern, how many potatoes will he eat on Friday?
5. Two carrots have the same mass as one potato. How many potatoes will it take to balance 22 carrots?
6. Instead of candles, my mother puts potatoes on my birthday cake. Last year, I was 10. What will my mother put on my next birthday cake?

Sports Context

It is not difficult to see how sports stories and statistics provide a wide variety of problem possibilities that have wide appeal. Consider, for example, the daily standings of professional hockey teams. What problems might be suggested by the following year-end standings?

	Won	Lost	Ties	Points	Goals	Goals Against
Edmonton	57	18	5	--	446	314
Calgary	34	32	14	82	311	314
Vancouver	32	39	9	73	306	328
Winnipeg	31	38	11	73	340	374
Los Angeles	23	44	13	59	309	376

These figures provide an illustration of well-organized data and provide practice for identification and selection of relevant data in various problems. Here are some possible problems students or teachers might construct at different grade levels.

1. How many games did Winnipeg play? (Primary)
2. How many more games did Edmonton win than it lost? (Primary)
3. The number of points for Edmonton has been left out. What should Edmonton's point total be? (Intermediate)
4. If the number of wins and losses for Vancouver were reversed, how

PEANUTS

many points would they have earned? (Intermediate)

5. What was the average number of goals scored per game by Calgary? (Upper Intermediate)
6. Vancouver and Winnipeg had the same number of points. If tie games were not counted, which team had the better percentage of games won? (Upper Intermediate)

Feature Article Context

Newspapers often contain articles which highlight a seasonal, recreational, or historical topic of special interest. An article written to commemmorate the fiftieth anniversary of the legendary indestructible airplane, the Douglas DC-3, gave the following information about one particular airplane built in 1942, which is still in service with the French navy. The plane's log book shows that it has used up 700 tires, 35,000 sparkplugs, and 160 engines. Following are some examples of problems that could be constructed and solved.

1. For every tire that had to be replaced, how many sparkplugs needed replacement?
2. For each engine replacement, how many sparkplugs were replaced?
3. What is the average number of tires, sparkplugs, and engines replaced each year since the plane was built?
4. If the plane lasts five more years, about how many sparkplugs will be needed to keep it in service?

A useful and interesting assembly of newspaper problems, appropriately titled "Newspaper Math," is available from Collier Macmillan Canada Ltd. (Fraser, 1980).

Summary

The main purpose of this article is to illustrate the wealth of problem-solving material in daily newspapers that has appeal for students. Such problems bring the real world into the classroom and motivate students better than textbook problems. Sometimes the problem situations do not contain enough information; other times, they contain more than enough. In either case, students should be challenged to construct problems.

It is also suggested that students should be given every opportunity to solve problems by different methods. Even if a method given by a student seems cumbersome, it may have the virtue of being understood by that student, and comprehension in problem solving is more important than churning out meaningless answers. Teachers who risk some loss of control in a truly open problem-solving atmosphere may be surprised by the growth in problem-solving skills and the improvement in attitude toward problem solving.

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REFERENCE

Fraser, Don. Newspaper Problems. Collier Macmillan Canada, Ltd., 1980.