Figure 11.3b. INDUSTRIAL PROBLEM SOLVING: The Role of Variation

Figure 11.3a describes recognizing, in the manufacture of components and their assembly into automobiles, the *inverse relationship* between component variation and the perceived quality of the finished product. The article EM9301 reprinted below provides another instance of the same idea in a different context: the delivery of quality *education* in schools in Canada. *Equality of educational opportunity*, indicated in the second and fourth paragraphs of the right-hand column of the article as a primary goal of Canadian schools, corresponds to *minimum (ideally zero) variation* in educational opportunities for all students.

EM9301: The Globe and Mail, January 12, 1993, page A15

SCHOOLS / *There's no way a national test can be fair to all students, or even useful. What counts is student ability, not the school, and high test scores would depend on the affluence and family stability of the nearby communities*

Why national tests won't improve education

BY GERALDINE GILLISS
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RECENT government and business reports express concern about the quality of Canadian schools. They propose to improve education by introducing national testing of students, reporting results by province or school, and letting families send their children to the schools with the highest test scores.

This assumes that test results can be used directly to assess the quality of schools and teaching. Canada's teachers oppose these measures, for three major reasons.

1) Under the Canadian Constitution, provinces have the power to determine what shall be taught to children. Local districts can in turn adapt the curriculum to the needs of their students. Any national test, no matter how well designed, will inevitably omit topics that some provinces value highly, and include others that some do not emphasize. Results will therefore favour the province whose curriculum most closely resembles the one implied by the test questions.

There is no national consensus about a curriculum that must be taught to all students. Therefore, no national test can be designed that is fair to all.

2) Research indicates that the most powerful influence on test scores is a student's capacity to learn. That capacity reflects not only innate ability, but also the impact of poverty, the educational level of parents, language first learned, mental, physical and emotional health, and racial discrimination. Anyone who expects students who are disadvantaged, impoverished, undernourished, neglected or severely disabled to score at the same level as students who are affluent, healthy, well cared for or able is doomed to disappointment.

Test results, to be useful, must include enough background information to identify the groups of students who most need help.

But current plans by Canada's Council of Ministers of Education to conduct national tests do not include collecting background data on the social and economic characteristics of the students. It is therefore unlikely that the results will provide any useful information on ways to improve education.

3) Test scores reported by schools will not give parents adequate information about those schools, since the major factor that determines the scores is the characteristics of the students attending the school, not the school itself.

This can easily be verified by leaving the staff in place in the highest and lowest performing schools, and by switching students. Unless all the research of the past 50 years is wrong, the test scores would move with the students rather than stay with the teachers.

THOSE who want to find the schools with the highest test scores need not go to the expense and trouble of national testing. They need only obtain census data on the relative affluence and family stability of the communities surrounding various schools.

Even if the highest-scoring school could be found, entrance requirements would soon need to be established to prevent overcrowding. The selection would inevitably lead to much greater segregation of students from advantaged and disadvantaged backgrounds, and violate the principles of democracy and equality of opportunity that underlie Canadian education.

The disadvantaged would be further harmed if low-scoring schools were punished for their "ineffectiveness" by having their funding cut.

Those who advocate national testing and school choice should become more familiar with the objectives of education and the research on student achievement in this country. They might find that the principal purpose of the schools is to offer all students equality of educational opportunity. They might learn that tests are imperfect and easily misinterpreted. Credible research on effective schools compares results only where the characteristics of the student populations are the same.

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1 In promoting the goal of equality of educational opportunity for all students in Canadian schools, the article EM9301 reprinted above appears to neglect an essential related matter, namely the *level* of opportunity to be achieved. [Continuing the industrial analogy, this level corresponds to the *target* about which variation is to be minimized in a manufacturing process.]

- Indicate one way in which *complete* equality of opportunity could be achieved, but at an *un*acceptable level.
- Suppose that, as may be the case in practice, the variation of educational opportunity *increases* as the level of opportunity increases. Outline the *consequence(s)* of such a state of affairs for the goal of equality of educational opportunity in Canadian schools.
  - Can you find, from your own experience, evidence either for or against the hypothesis that variation of opportunity increases with level?

(*continued overleaf*)

2 Ms. Gilliss gives three reasons why she claims that teachers oppose the introduction of standardized tests in Canadian schools under conditions she lists.

- If you had to give a rebuttal of Ms. Gilliss' *first* reason (presented in the left-hand column of the article EM9301 reprinted overleaf (on page 11.15), outline the point(s) you would make.
- Compare and contrast Ms. Gilliss' *second* and *third* reasons, given at the bottom of the left-hand column and continuing for most of the middle column of her article.

3 Ms. Gilliss mentions the *quality* of Canadian schools in her opening paragraph.

- How might quality reasonably be defined in this context?
- What does Ms. Gilliss indicate elsewhere in her article about the impact of national testing on the quality of education in Canada?

4 Near the bottom of the left-hand column of her article, Ms. Gilliss states that ..... *the most powerful influence on test scores is a student's capacity to learn*. What influence does Ms. Gillins indicate for the quality of *teaching*?

- Briefly suggest reasons(s) why quality of teaching might be a *sensitive* issue for a person in Ms. Gilliss' position.

5 Standardized testing in schools can be thought of as a *measuring process*.

- What does Ms. Gilliss identify as the *variates* being measured by standardized testing?
- What does Ms. Gilliss say about the *consequence(s)* of measuring difficulties in the situation under discussion?

[Related issues about measuring results in schools are taken up in three articles reprinted from *USA Today* in Figure 2.14b of the STAT 220 Course Materials; these articles, and Ms. Gilliss' article overleaf on page 11.15, were part of extensive discussion in the media, over a number of months, about the quality of the education received by students in Canadian schools.]

6 Compare and contrast the roles of *measuring* in improving quality in the *Ford Batavia* video, described in Figure 11.3a on pages 11.11 to 11.14, and in improving the quality of Canadian schools.

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