

Part I

Canada Goes Metric



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Ladies and gentlemen; to borrow from a distinguished Canadian, "my fellow metricators":

One million metres is not a measure we often use in casual conversation (strictly speaking, one could call it a megametre), but I have found that it is the distance which one has to travel in Canada (in education) to be considered an "expert." Having got up at five and put in my million metres by ten today, and now, by twenty-one, being firmly entrenched as "enthusiast" if not "expert" within the Ontario establishment, I'm delighted! The new status symbol, in addition to the million-metre -- I almost said "mileage"! -- is, of course, the A8 calling card. You'll notice how they flash them within the Ministry of Ontario and they flash them within the Metric Commission.

In theory if not in fact, we're all of us in the same trade, so you can appreciate that I have before me what might be termed (in the jargon of our profession) a "challenging assignment" . . . challenging especially to that teacher who thinks not that "Happiness is Going Metric" but that "Happiness is Homogeneous Grouping."

Your experiences in the classroom will have taught you that if you short-circuit the ritual of "teach--test--reteach," there are times when you regret it . . . at least, that's the reality of my twenty-odd years. So what do you do when

confronted with a room full of highly knowledgeable people . . . sprinkled with newcomers here to learn . . . all, really, here to find out? I will willingly err on the side of telling you things you already know. Let me offer two justifications for that erring, if indeed it is that.

In January, I acquired a rather remarkable diploma -- I think for the feat of surviving eight air trips within the Land of the Free, four of them on a Sunday of curtailed flights, and making my way from Truro, Nova Scotia, in early morning, to Biloxi, Mississippi, by sundown. I was a participant, and modest contributor, at the International Conference on Metric Education.¹ A group of fifty corralled me in what otherwise would have been an empty room, and had me fill them in on some of the things we in Canada have been trying to do. In the course of my talk, I made passing reference to the White Paper on Metric Conversion in Canada which was published in 1970 and which offers, at this point, some fairly basic insight into the rationale for Canada's apparently drastic decision. Spontaneously within that audience there developed considerable interest in this white paper (available from Information Canada for 50¢). But this was Biloxi, Mississippi, and in that room, dozens of key American educators, vitally interested in metric education, apparently and actually had not heard of the United States Metric Study. They were reaching out for an unimposing Canadian document, lacking awareness of the most remarkable effort in metric conversion and metric education. Commissioned by Congress and bringing together in most impressive fashion arguments for and against metric changeover, the study, aptly titled A Metric America: A Decision Whose Time has Come,² no doubt was highly influential when the vote was taken in the House committee. So, if they hadn't heard of the United States Metric Study, and perhaps some of us hadn't known of Canada's White Paper, you've an inkling why I may dwell on some things that you might feel need not be said.

I encountered a second such situation in our nation's capital when I was a guest of the Metric Commission, Education Sector.³ At one side of me at the sector meeting sat our good friend Frank Barrett, representing textbook publishers of Canada. On the other side was a gentleman with whom I found myself in casual conversation. He officially represented one education-related group vitally interested in metric conversion and it came out that he had not heard of the term SI. *Système International d'Unités* (SI) is the modern, international metric, to which we are converting our thinking if we are the physics teachers, the chemistry teachers, of a generation past.

¹International Conference on Metric Education, directed by Dr. John M. Flowers, University of Southern Mississippi, held at the Sheraton-Biloxi, Biloxi-Gulfport, Mississippi, January 21/23, 1974. In this connection see H.D. Allen "Canada Leads U.S. in Metrication," *The Teacher* (Nova Scotia Teachers Union), 12:11 (February 15, 1974).

²United States Metric Study, *A Metric America: A Decision Whose Time has Come*, National Bureau of Standards Special Publication 345 (Washington: United States Government Printing Office, 1971). Price \$2.25

³Metric Commission, Steering Committee 10, meeting of October 10, 1973.

It would seem that the benefits of metric conversion are as fully "self-evident" as any of Euclid's axioms! The two cited in every study are the universality of the system (now the dominant system, or becoming so for 90 percent of the human race), and the simplicity, the coherence, of the system (which, for us as educators, is at least as important a reason). Historically, metric is the only *system* of measures that man has produced . . . the only system created to be just that, a system. Historically, it was in the reign of Elizabeth I that two units of some antiquity, the yard, a fairly basic anatomical measure, and the mile, the thousand (double) paces of the Roman legion (as it marched across Europe two thousand years ago), were legislated into coexistence with a factor of one thousand, seven hundred sixty--that is a "system" only after the fact! To us, in what we like to think of as enlightened perspective, a good question would be, "What has been the resistance to a clearly needed change in something very fundamental in our lives?" *Newsweek* recently published an article on the American scene, and quoted from a charming little verse from the England of 1883. It recalled for me Kipling's "Recessional," and that line, "lesser breeds without the law." It goes like this:

Then down with every metric scheme
Taught by the foreign school
We'll worship still our father's God
And keep our father's rule--
A perfect inch, a perfect pint,
The Anglo's honest pound,
Shall hold their place upon the earth
Till time's last trump shall sound.

Eighty years later, Britain quite reversed that attitude! In *Popular Science*, as a follow-up to a good article on metric conversion, there was delightful "anti-" letter which had this sentence (with which we, as educators, I think have to cope): "It's silly to junk the reliable, workable system we have and crucify the American public on a metric cross."⁴ Lot's of luck! Something I don't think we've seen in Canada, that an Australian colleague tells me about, that's the phenomenon where in Australia they've moved further into metric measures than we, and publicity has reached out to the man in the street, and there have been those, possibly of an older generation, who sincerely believed that if they ignored it long enough, it would go away. We in Canada, I would gather, have no such illusion.

I'm going to talk to you about metrication (if you would, "metrification") and, in particular, metric education -- from the vantage point of its effect on people. My university physics is more than twenty years old . . . they pounded it at me, at McGill, in the best of traditions. I can recite how MKSA symbols were written -- for multiples, with capital letters. They may still do that in college physics texts, but the metric of tomorrow (and, hopefully, today) is SI, and it knows other rules. So while I have the intellectual foundation that the science teacher should have (and which makes him, potentially, a leader in metric

⁴Edward Edelson, "Here Comes the New 'Yardstick' in Your Life," *Popular Science*, 203:5, November, 1973, and "PS Readers Talk Back," *Popular Science*, 204:2, February, 1974.

change-over), I too have had unlearning to do. I recall the fine spring day when we took the big green college bus and headed a couple of kilometres out of town. We had a plan of a plot of land. As an exercise, we calculated its area (it was pleasingly irregular, having a stream as one boundary, a curving road as another) and had come to the conclusion that it closely approximated our new unit of land area. We went out, walked the land, and (in the jargon of the younger generation) got a "gut feeling" for what a hectare really is. There would be an easier way, when you think of it! Run one hundred metres, then consider the square inscribed on your path. You'll have the hectare. As most city people never did grasp the acre, this will be progress, and perhaps significant progress if we are to teach measurement concepts as we never really have before.

I've learned from all kinds of people, from questions they have asked and from some they didn't ask. One of my ways of tuning in on how real people out there think is perhaps unusual for a teacher (teachers are intimidated in this direction, by tradition), but very satisfactory. There is a social institution which can have no parallel and that is the open-line radio broadcast where the listener phones in and where (as a colleague in the publishing industry expresses it) radio becomes "a public confessional." Whatever is on their mind, they say . . . and all the neighbors down the block listen in and nod. I have chalked up a good many tens of hours (not a fundamental metric unit, but you know what I mean!) on open-line programs in little Maritime communities.⁵ It is a rather unique way to think along with people, and to learn, as a result, how people think. They will listen to you for, say, twenty minutes. By then they know what some of the uncertainties or reservations seem to be. Then they pick up the phone. What they have taught me I am happy to share because I think there are lessons to be learned. We in education are very dependent on the good will of the people out there -- as someone said to me in teacher training, "they send us the best children they have" -- they support us, and without their backing we can do little.

A young housewife assured me that one thing for sure was going to happen in metric change-over -- people were going to be cheated, they were going to be "taken." All I could counsel her was that, while I respect the role of government in consumer protection, I also comprehend and respect a militant consumerism, the kind that (when there's cheating) can hit back where it hurts. One older lady brought home to me some facts of life that I share with you: most of us, I guess, are old enough to have recognized a mathematically periodic variation in skirt length over recent years. A few years after my college days, skirts got conspicuously shorter. Nobody was speaking metric measurement in those days (not in girl watching, in any event), but there was something to be learned from the phenomenon. Anyone who complained to a clothing merchant that a dress this long was costing fully as much as a dress this long, was told that essentially the same labor went into a short skirt as a long skirt, and that labor really was the factor determining cost. Years passed, styles changed, and skirts got longer again. The same matron, on noting that prices were up, was informed, she assures me, that more

⁵Tapes and typescripts of a number of these "open-line" hours have been deposited with Nova Scotia Teachers' College Library, to which enquiries may be directed.

material was involved, so of course the cost was more! I'm worried that metric conversion will be the future scapegoat when, as now, inflation likely will be the real contributing factor. Conversion need be no fiscal ogre. On the contrary, coupled with intelligent "product rationalization," it can be an economizing factor.

Some people are more than a bit frightened at the prospect of metric conversion, a little timid, bewildered, confused. They've little need to be. I'll not forget an elderly lady who called in while I was on the air on a rather pleasant morning talk show. She needed to know how much a kilometre was. Without stretching my arms too much before the microphone, I tried to put across to her (without resorting to conversion factors) how far a kilometre was along a road . . . how long it might take to walk. She assured me that this was not what she had in mind. Her need was to eat a kilometre! I suggested that she might be thinking kilogram, and she brightened audibly, "Yes, that's the word! Every day I'm to have in my diet a kilogram of salt" I suggested a measure in the gram or milligram range . . . and urged a friendly chat with her physician or pharmacist, a chance to see measured out the amount that had been suggested, and she seemed happy. But you see that she had been genuinely confused, anxious, and glad that she could call me. I was glad too. Another call I'll not forget was from a retired school teacher who attacked me at great length and with no uncertainty in her voice, saying: "This metric--it is hard. I've taught it, and I know it's hard." She had little use for people (nine-tenths of the world) who'd not make the effort to learn our ways. Metric is hard . . . I have no doubt she was right. It is very possible to teach metric in such a way that it is hard . . . and this is a matter that we must give thought to. This SI is in every sense so simple . . . if you do it right. If you don't, you confound yourself and complicate the issue and are in real trouble.

I think we all know that modern metric had its roots in the 1790s in what an anti-metric America once termed "atheistic French revolutionary thinking." The system was, throughout, to be built on tens, and at the outset they did go a bit far. Why, they wanted a ten-day week and a ten-hour day, and of course they started the calendar again, l'an un, Year One of the French Revolution! They looked to a right angle divided into one hundred parts, called grades--which you could still find in a trigonometry syllabus into this century, though they appear to have seen no practical use. That initial concern with 'tens' was to evolve and be refined. The tens, of course, derives from tens numeration (and ultimately from the fact that early man reckoned on ten fingers) . . . and it's beautiful "reinforcement." Any Grade I teacher can well appreciate the soundness of grouping by tens and thinking in tens, in numeration, in money, in all measurement. I can remember our Grade III teacher (in my first principalship) -- her "thing" was boxes of drinking straws . . . with elastic bands around every bundle of ten, and ten bundles of each box (*that* was "one hundred"). If all measurement reinforces that kind of thinking, then, clearly (I think) the interest of the young child is being served. I claim that SI is simple iff you do it right -- that's the mathematician's i-f-f, "if and only if." I suggest that the way to take on these concepts is by immersion. I know no other way. I think the only parallel we have is the learning of a second language. Now, I am a self-confessed product of the English schools of Quebec of twenty-five years ago . . . when I could boast a first-class standing in French (Language and Literature) and yet be able to do little other than pass Quebec's High School Leaving Examination -- French was a

"required subject"! Nonetheless, despite (not because of) all that, I can communicate most effectively in French (and I guess effectiveness is a criterion) simply because, fifteen years later, I took on principalships in communities like Chibougamau -- the northern Quebec mining field -- and Arvida, in Saguenay-Lac St. Jean. My schools were English. But Chibougamau is 90 percent French. Saguenay-Lac St. Jean is 99.5 percent French. You learn, you learn fast when you have to, when you're truly immersed in a "learning situation." There just may be a parallel there, in terms of measurement learning. Immersion may be a logical, even necessary first step to absorbing and truly learning measurement concepts.

One day in the Truro paper we published a rather remarkable map of our town. I use the Truro paper. It works well. You see, no self-respecting young lady in teacher education is going to listen to a college instructor talking in a lecture room about something she won't be using for another year, and not turn off when he walks out of class - it's probably a part of good mental health! Nevertheless, if something's in the town paper, or on local radio (even if he put it there), she is likely to find it a topic of conversation in the boarding house over supper . . . at that point she may not even realize that she is learning! The map of Truro town streets was dimensioned solely in metres and kilometres. On it were marked strategic points one kilometre from the building where our students go to classes. A fringe benefit, of course, was that by making a classroom of the community we reached into schoolrooms and reached the adults. It eased the way, I feel quite sure, for our girls in their teaching, to try a metric immersion approach.

You know, this may surprise you, but many of the "problems" of metric conversion, when you look right at them, really aren't there! Halifax, from Truro, is a nice, neat, sixty miles; it's a nicer, neater, one hundred kilometres. When you get down to it, local people think of it neither way. By car, it's an hour and twenty minutes on the Trans-Canada. When you buy gasoline, the litres will be more than the gallons, but who watches either click over? Dollars and cents clicking over - that's what you watch. So often measurement is not in terms of the units we stress in the classroom, but of other, more directly relevant concepts.

Some of my students joined me for a special tour of Colchester Hospital in Truro. We wanted to see if a Canadian hospital really was as metric as some claim. Well, in a hospital as in a school, budget is a very real consideration. Good equipment is hardly likely to be discarded solely because it's "unmetric." Granting that, Truro's hospital was a wholly metric place. If you're born there, your mass is recorded in kilograms, your length in centimetres, your temperature in degrees Celsius, and your time of arrival is noted from a twenty-four hour clock. That's the kind of information which the hospital communicates to its computer. I suspect they still tell a mother what she wants to hear! An adult may "weigh-in" on an old scale down the hall - the reading being in pounds and quarter-pounds, but there's a chart on the wall (wholly lacking in concepts of precision or "rounding") which produces the kilogram readings for hospital records. All clinical thermometers are Celsius, with 37° the sign of good health.

My children have a feeling for Celsius which you might envy. We spent a pleasant summer in a Laurentian cottage, agreeably apart from electric light and

other urban things but with a Celsius thermometer on the porch. *Celsius only.* They're not that good at the "five-ninths, nine-fifths, add thirty-two, subtract thirty-two" thing, but who cares! They do know that on a brisk August morning if it's ten or twelve, you get a sweater on, but sunny August days warm up, and once it's twenty you're fine in shirt-sleeves. When it edges toward thirty, you peel off all unnecessary clothes! We never did see thirty, but twenty-eight suggested swimming trunks . . . and our thoughts were far from the zero that brings ice to the ponds. One of Australia's "metric conversion" postage stamps, a clever set of four put out to promote the change-over a while back, shows a likable cartoon character (common to all four stamps) learning the new meaning of thirty-eight degrees. Lying on a beach, tongue hanging out, toasted a fairly rich shade of red, he gasps out "38°C" (and, purely as an aside, 100° Fahrenheit)! Our girls at Teachers' College have the chance to get such a "gut feeling" (if you would) for Celsius temperature. Outside the main entrance is mounted a thermometer, pointedly "Celsius only." Look at it each morning and you learn! It's hard here in Canada to get a Celsius-only outdoor thermometer. You may have to cheat a little. Take a "dual" one, then reach for the white paint or white correcting fluid. Presto! -- Celsius only!

One thing we must note -- it's a sobering thing -- is how bad a job, for better or worse, has been done with the teaching of the traditional system. Most of us have little feeling for the measures. When you think back to the textbooks, all of them, of decades gone by . . . a page starting by naming the units, then stating the relations, then you were into computation . . . sixteen ounces to the pound, five and one-half feet to the rod, four pecks to the bushel (you remember these things!), and then you proceeded to word problems and computation. I think at this point the concepts were lost to the paperwork and you were doing calculations with things that might have been just so many words. I doubt that too many teenagers today could look at the other end of this room (down where the sign says, "Litre is Sweeter") and give an estimate in yards, in metres, in anything. Measurement concepts have not really been learned and I'm not sure that a textbook, seatwork approach lends itself to the internalizing of such concepts. Other types of activities should be given a chance.

I always like to use "real" things when doing metric. There's an artificial, sterile world in the hospital or laboratory. I don't want students to associate metric with erlenmeyer flasks, graduated cylinders and triple-beam balances. I want them involved with the kinds of things they live with. What I would do is what Jack Bell tells about the school in England that had the most simple, sensible approach. You go out and buy the best metre stick you can find. You put it, literally, on red velvet, outside the principal's office, and it becomes the standard for the whole school. At this point, each class replicates the standard. As a learning experience, it's sound. For mass, replicate a standard kilogram. For capacity, a litre. Your litre might derive from a laboratory standard, say, a one hundred millilitre graduated cylinder emptied ten times into a quart milk bottle. The litre line on the bottle (with an indelible pen) would provide the standard to replicate.

We need planning at this point. You sense this, I'm sure. We need longer-range planning, and we have every indication from our good friends in Ottawa that this planning has been going on and will be going on. We are starting to feel the impact at this point. When you don't have sound planning, you know what happens.

An executive of Eastern Provincial Airways told me one conversion story. Cockpits not so long ago were converted so that instruments read knots rather than miles per hour. (The American influence in retarding the metrication of international air travel has been real.) Then they were short in their peak season and leased a DC-9 from Aer Lingus, the Irish airline. The dials read kilometres per hour! The flight crew learned. They learned fast! We all can, you know. But you see here the possibility of double, two-stage, change-over, and you hope that proper planning can minimize the phenomenon. The only time I've written a letter to the *Globe and Mail* was when they ran a front-page feature story telling us how inflation was reaching the point that price calibrations on scales in supermarkets no longer could give the price for the more expensive commodities.⁶ Real cost was going to be involved in converting those scales to higher price ranges, it was pointed out. My effort was to urge them to look one step ahead and take into consideration eventual conversion to a new system of units.

I think it is very important for all of us that there be the quickest possible change-over, in all sectors, to metric sizes. The pharmaceutical industry prides itself in its leadership in metric standardization -- and rightly so. A tube of toothpaste today is 25 millilitres, 50 millilitres, 75 millilitres, 100 millilitres, or 150 millilitres -- as simple as that. (The "old days" knew 29 sizes, and price and size comparisons were incredibly awkward.) Now, to buy a tube of toothpaste, you reach for the tube, that's about it. It's true in virtually all shopping. Who reads the small print? But if you're going to read the measurement, no doubt for price comparison, then it's there and it's simple (which might encourage the consumer to do it more often). An unfortunate approach to change-over is represented by the "quart" milk carton, dually labelled "1.14 litres" . . . everyone thinks, and quite rightly, "a quart of milk." There really is no transfer when the size is conventional and the label dual--metric tokenism! Perhaps a logical "first stage" -- but, hopefully, an abbreviated one.

All of us know the views on metric education of our national body, the Canadian Teachers' Federation. I think many of us in our minds applauded when CTF called upon the Government of Canada for rapid change-over and when they insisted that "dualism" (where old measures persist alongside the new) impedes learning.⁷ I think we all have arrived at the conclusion that this is so. I have pedagogical points which I'm anxious to make. I think the most important message that I have - a reminder for Ottawa and an observation that has important ramifications for your classroom - is that metric *is* decimal. That's what it's all about. That's its main virtue. It is decimal like the numeration system, like Canada's monetary system. Metric is decimal.

⁶"40 to 50% of Retail Food Scales Cannot Accept High Prices," *The Globe and Mail*, September 8, 1973.

⁷CTF News Service, "The Metric System--Immersion vs. Conversion," *The Teacher*, 11:14, April 1, 1973.

I go into our hardware store and the old gentleman who owns it takes aside the self-confessed metricator and says, "I want to show you something." He shows me, typically, a box of screw-eyes from a brand new shipment, observing: "A hundred; they used to come by the gross. Now, often when I order two dozen of something, they come as two tens and four singles." Such decimal thinking (thinking in terms of grouping by tens) I think is on the increase. In a metric world it will make even more sense.

Canadian money is decimal money, we assert. Well it might be, for the rash of hurried decimalization of the 1960s has wholly freed the world of pounds and rupees with nondecimal subdivisions. Look particularly to Canada's dollars, the folding money: one, two, five, ten, twenty, fifty, one hundred -- just the sequence that a metric man would have ordered! Such a "preferred decimal sequence" you also would look for in metric "masses" for the science lab. You'd hope to find them, too, on grocery shelves. Time will tell. Ottawa has leadership to offer in this area. So, interestingly, Canada's bank notes, as evolved, provide a model for all decimal measures. (Note that two and five are exact divisors of ten.) Coinage, quite frankly, is a bit of a mess! We could do with a two cents and a twenty cents. The twenty-five cents (quarter dollar, the Americans call it) should be living on borrowed time. Our coinage concepts we inherited, at least in part, from Spain. A few years ago, a bulldozer in Lower Sackville, Nova Scotia, brought home this point. Ploughing into a mound of earth it hit an improbable jackpot -- silver dollars rolled out, Spanish milled dollars, "pieces of eight." (That's not metric!) The Spanish dollar coin at times literally was halved and quartered, like so many pieces of pizza, and a quartered eight-real piece gave you two reals, or "two bits" (which persists as slang for 25 cents). My point is that metric is decimal (I maintain this!), and decimal does not half, quarter, and eighth. When you find a litre measure divided into eight parts (and there are several brands on the market!) think about what the teaching aid is attempting to do and whether it is appropriate to your aims.

If you're a secondary mathematics teacher, or ever have been, pose for yourself the rather sobering question, "Who needs fractions"? There's no glib answer to that question. Certainly, there is need for non-decimal fractions. Children need the rationals, their structure, properties, operations, algorithms, and so on. They need skill in manipulating rationals. Ratio means fraction. The linear equation (even with integer coefficients) needs fractions for exact solutions. So fractions are needed, even in an essentially metric and decimal world. But that leads to the next question. At what level are children going to have these needs? At what level is it appropriate that we offer this material (which many now find difficult, even distasteful) in the total pattern of educational development? I don't have pat answers to that, but I do urge that it has to be thought through. You may come to the conclusion that much fraction work has come all too early (is there such a concept as "fraction readiness"?) and that more than some, in a metric world, could only be defended by that quaint Victorian phrase, "mental discipline"!

I am something of an antiquarian, unapologetically so. I collect old mathematics texts. I love them, and what I find in them, representing what teachers

were honestly trying to do in the classroom.⁸ I find challenge in them. A term I learned from my Grade IX arithmetic teacher was "apartment-house fraction". It had fractions in the numerator and denominator (and it wasn't a good one unless they had four-figure denominators. One consolation, the answer often was absurdly simple, say I!). They're a challenge . . . I did enjoy them, the way some, I suspect, enjoy the cross-words of the *Times* of London. The question is, do they represent a "universal need" in terms of the "real world"? Or did they ever? I suspect not. Even as I leaf through current texts and find a child in Grade V adding "five-sixths and one-half and thirteen-fifteenths," or in Grade VI taking seven-fourths and dividing it by four-fifths, I wonder. I can let you in on this much--from hitherto unpublished memoirs of a textbook writing team! Try to produce a set of "word problems" on non-decimal fractions, problems that children can identify with, based on their world. You're in trouble . . . once you've used up "three-sevenths of a week" and "five-sixths of a pizza"! You think about that. Do right by "metric" (no "one-third of a metre"!) and your examples tend to derive from vestiges of non-decimal measure . . . quarter hours, thirty-degree angles, and such. Reach for the pizza! No, I have no clear-cut answers. I suggest that the role -- the emerging, redefined role -- of the non-decimal fraction needs to be looked at most carefully. Right through elementary grades, it has a place, but a redefined place and purpose, in computation and measurement and problem solving "strands." The level where needs occur, the level where it is appropriate to teach, must be redetermined, particularly if students are to have deeper grounding in decimal fraction concepts and computations (which "going metric" would seem to imply). I do suspect that there may be fairly "inevitable" conclusions, but only after very considerable "thinking through" and "talking through." I do say this (to indicate one line of investigation): a great deal of computation involving non-decimal rationals, as for example the collecting of terms and solution of a linear equation with rational coefficients, can be quite eliminated by "multiplying through" . . . not necessarily by the "least common denominator," any common multiple of the denominators will do.

Ottawa has done its work well (we say at this point) in providing Canadian standards reflecting international "metric" usage.⁹ Those of us who perhaps pioneered in Canadian metric education, doing our best to second-guess Ottawa in the

⁸For a glimpse of the attractiveness of some older material, try H.D. Allen, "Relieved Beggars and Watered Gin," *The Teachers Magazine* (Provincial Association of Protestant Teachers of Quebec), XLVII, 237 May, 1967, and "Nineteenth-Century Canadian School Mathematics," *McGill Journal of Education*, IV, 1, Spring, 1969. My own favorite is "The Verse Problems of Early American Arithmetic," *Journal of Rutgers University Library* XXXIII, 2, June, 1970.

⁹Definitive studies on metric usage for Canada are: Canadian Standards Association, *National Standard of Canada: The International System of Units (SI)* (Reference Z234,2-1973, 29 pages, \$2.50); and *National Standard of Canada: Metric Practice Guide* (Reference Z234,1-1973, 44 pages, \$4). A four-page leaflet, Canadian Standards Association, *The International System of Units (SI): An Outline of Canadian Usage*, CSA Special Paper, June, 1973, provides a summary. Up to six copies may be obtained without charge from the CSA, Rexdale, Ontario.

seemingly endless interval before the Standards Council of Canada brought down its extremely important documents, were somewhat in the dark as to how we should spell (decametre or dekametre?), how we should symbolize (dam of dkm?), and how to handle some related considerations (decimal point or decimal comma? . . . thousands comma or thousands space?). Today no such questions are left unresolved. The documentation is before us. It seems to me that at long last we as educators can talk pedagogy, sort ourselves out, then go ahead and do our job. I think we have the right to look to Ottawa for leadership in national awareness of this metric commitment on the part of Canada . . . and the "logo" that has been adopted may be the symbol of that leadership on a great diversity of products over the years ahead. I think there's a definite and apparent need for co-ordination within that extremely complex organism that is federal government. Let me illustrate. A rather striking thing happened in our metric education efforts a few months back. I decided that one way to get our college community thinking "metric" would be to take the Truro weather data for a particularly spectacular month (then just ended) and to present it in the town paper in chart and story form . . . totally in international units. Across the river from Truro, in our "suburb" of Bible Hill, is a federal government weather office . . . and a most obliging weather officer. He gave me all I needed (covering a whole month) over the telephone: the precipitation, the daily "high" and "low." One thing came through, increasingly, in the conversation. He knew who I was, where I worked, and what I wanted to do, but when I talked about Canada "going metric," he thought I was talking science fiction! He is a federal civil servant. There is work to be done in this area of communications if leadership is to develop early in all sectors and if we in education are to be supported in the job we urgently seek to do.

Equally, I think we as Canadians have the right to look to our respective provinces and territories for leadership in their areas of special competence. Education immediately comes to mind, and this would include most aspects of adult education. It's a big job. We know that!

Canadians have the right to expect the schools to pass on to the young the benefits of thinking and living with metric units -- as a system -- and to me that means totally and effectively. I don't think that "metric" is this much a part of Science and this much Mathematics . . . that won't take any more than my high school French took . . . it's got to be a part of total living experience and I think it can be. Think of a school community, a team of teachers and learners. I don't think it's bad when the teachers themselves become learners . . . and leaders in learning, in a very real sense. I view "metrication" as a particular challenge to the young generation. It need be no burden to the older who, if you would, have a choice of two roads (you still reach for the package on the grocery shelf, and unless "metric" is your interest, you'll not likely read the small print). I think the challenge to the young recognizes that they will most benefit . . . and they will live on into a Canada that is metric . . . a world that speaks one measurement language. I like to see them meet this challenge.

One fine little community in Nova Scotia is just off the Trans-Canada (the tourists may not see it) and it has a well-earned reputation for people working together to get things done. That community is Brookfield. It's eight miles from Truro (you'll pardon the expression!). Junior high school students there have a big sign outside their school. In school colors it tells how many kilometres from Brookfield to Truro, and to all the other Nova Scotia communities they could fit

on the sign. Junior high school students built it, from the ground up, from donated materials, spurred on by a dedicated mathematics teacher . . . with some technical advice from some of my student teachers. We were invited out to the unveiling last June. We were proud of their clean four-inch numerals (somewhat embarrassing!) on the big eight-by-four plywood sheet (one must be realistic!). We had made an earlier sign, somewhat similar, on the College grounds. In the summer, tourists hold up rush-hour traffic to pause and read. Yes, they copied us, more or less. That, in education, is the sincerest form of flattery, we all know. We live in the world of the present (eight-by-fours!), but we reach for the future. Schools and parents often approach us, and this is good. I'm not surprised to be hailed in the street by a total stranger . . . maybe Truro is too small a town to have "total strangers," at that. One man is a carpenter. He is very enthused at the prospect of metric measures for his children. He is interested. He is a potential leader for the community . . . one Canadian citizen. A mother recently told me on an open-line show that she had a boy in Grade X. He was doing metric, liked it, and found it simple. (She was rescuing me from the retired teacher who had insisted that metric was "hard.") I'm glad that we can still in Grade X produce that feeling . . . that "metric" is simple. Young children, one mother told me, are being instructed to buy rulers with centimetres on them. Well, if they're "dual" (and at this point, very likely, they are), I hope they have the courage to "shave off the inches"!

Dr. Daniel DeSimone, a leading personality in the move to "a metric America" and I had a most interesting discussion recently. He did bring up one point that I think has great relevance for us, and that is that there's (he'd want you to pardon the expression, I think) no "political mileage" in metric support. You'll not win votes by pushing for metric conversion. I hope that those who lead us in Ottawa have the courage to give us the firm leadership in this area . . . even though I must concur (as I talk with elderly voters and the less informed) that there may be less than "political mileage" in a forward thrust. There is a need and there is a priority. This I'm sure we all see. (All political parties have come out in the Commons in support of our metric commitment. It would be hard to oppose.) Dr. DeSimone spoke with some feeling about what he termed "phony issues" relating to metric change. He must cope with them in Washington. You may have met their Canadian counterparts in suburbia. People are saying that metric is not going to solve America's problems of international trade . . . that metric is not going to revitalize American industry . . . that metric will not solve all the problems of education in the United States. No, but it may help, it may ease the burden. It certainly is a step we're inclined to recommend taking, argues Dr. DeSimone. He suggests that what is called for is "the rule of reason" in guiding the change-over . . . that, after all, an entirely voluntary change-over is foreseen.

Metric is not hard. That we know. Unlearning the old, freeing oneself from old thought patterns, that's hard! I don't really know who first observed that, but it gets right to the heart of the problem. I do emphasize, however, the need for a certain caveat on teaching aids. In Biloxi in January, I got a notable silence when I observed that there were some superb teaching resources then and there on display . . . but that 90 percent I wouldn't take home! Which is to say that (for that cross-section of primarily American-produced products) the metric symbolism was wrong, pedagogy was wrong . . . colors were bright, but that's not enough. Now that we, at least in Canada, have the standards, the symbols, the

preferred practices, we have some ideas, educationally, mathematically, about what we are trying to do. If you find centimetres subdivided to halves, ask yourself why! (The implication is measurement to the half-centimetre, which implies looking to the fourth.) If you find litres divided to eighths, and metresticks into fourths (in technicolor!), think about it again . . . your educational aims and whether they are being reinforced or whether they are being eroded. One aid which makes me shudder teaches place-value but garbles the SI and the symbols. Would you believe "myriameter" -- the textbook "unit" for ten thousand metres which has no use on earth! At the other extreme -- "capital m, little m, period" as the symbol for millimetre on an "aid" currently being widely promoted to teach "metric." As I say, we need to be discerning buyers. We're in a position to be just that. We can hope to see--and to influence--the sound products that will support the teacher in her classroom efforts to provide the advantages of modern metric for the young, and the not-so-young.

There no longer is an excuse for being wrong and it gives you a lift to know you're right, but you have to have a sense of humor in all this. This fine, sunny March day I would put down as 1974.03.06. I like it. It makes sense. Note the progression from larger to smaller units, while acknowledging the calendar's nondecimal subdivisions. I use it in metric correspondence, and I find that when people write back, they've picked it up. (We'll do a lot of "metric" teaching by good example, I suspect.) So, I see nothing wrong with "eighteen" or "eighteen o'clock." I think we can dispense with the military "eighteen hundred hours." But, as I say, you need a sense of humor. When I was flying on Air Canada (our government airline) this morning, I leafed through the boutique brochure. They were offering "Sculptured acrylic inflation ruler, measures 13 inches instead of good-old-days 12 inches, a perfect gift in these days of inflation." Now, as educators we realize it could have been worse. It might have been 39 inches replacing an inflationary "yard," or "one-third of a metre" - hardly decimal.

I'll tell you one more story, about "Miss 90-60-90," an anonymous, perhaps fictitious, Ottawa girl. I liked her. When I first came in she had brightened all these walls but I note every one has been squirreled away. Miss Buffy (actually a pale reflection of the British one published by Her Majesty's government) has already become a collector's item. When I was in Ottawa in October I asked for a pin-up for my office. There followed an embarrassed silence. "Oh, no"! someone volunteered. "There's a box full of them but we're not giving them out. We've got orders." "Ah, women's lib"! I suspected. So instead we have the gangly male basketballer and the diminutive girl jockey and if women's lib is any happier with that characterization, I just don't know. I don't think it has the visual appeal, but like Australia's cartoon postage stamps, it makes its point; it's official and acknowledges a commitment to a metric tomorrow. Maybe at some point in our enlightenment we will set up a "Miss Metric" to even outdo industry's "Miss Buffy"--then drape her (slightly rotated, I do think) in the logo of the symbol of Canada's metric commitment. Finding her might be a challenge to that advertising agency. I do think she would catch the eye.

There has been real inertia to overcome. It has been largely overcome in our sector. Momentum should carry us forth into a metric tomorrow.

