Numeracy

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Over the last 10 years, numeracy—or mathematical literacy, as it is often called—has become more and more prominent, showing up in curriculum documents and special government initiatives around the world and in western Canada. In our local context, numeracy (or mathematical literacy) is featured in the Alberta program of studies in the front matter of every math curriculum document from kindergarten to Grade 12:

> Students are curious, active learners with individual interests, abilities and needs. They come to classrooms with varying knowledge, life experiences and backgrounds. A key component in successfully developing numeracy is making connections to these backgrounds and experiences. (Alberta Education 2007, 1)
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> Students are curious, active learners with individual interests, abilities, needs and career goals. They come to school with varying knowledge, life experiences, expectations and backgrounds. A key component in developing mathematical literacy in students is making connections to these backgrounds, experiences, goals and aspirations. (Alberta Education 2008, 1)
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> Students need to explore mathematics through solving problems in order to continue developing personal strategies and mathematical literacy. (Alberta Education 2008, 2)
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> Students will develop the following mathematic competencies in the context of solving everyday problems. Students will . . . apply mathematical literacy to everyday situations. (Alberta Education 2006a, 4; 2006b, 4)

So, what is this thing called numeracy? Clearly, it is related to, but somehow different from, mathematics. To answer this question, we need to first understand where the numeracy movement is coming from.

Numeracy Movement

Around the world it has long been recognized that students are completing their compulsory education without the mathematical skills to cope with what life and work will demand of them. In reaction to this, we may want to increase the amount of mathematics being taught, to lengthen the period of compulsory mathematics, to increase or deepen the mathematics content in our curriculum, or to raise the standards in mathematics. On deeper reflection, however, it becomes evident that many of our best students—those taking mathematics beyond the compulsory level and achieving the highest marks—are just as ill-equipped to put their mathematics education to use in life and work.

This realization led to the rise of the numeracy movement—a movement designed to foster the skills the world is thirsting for in its graduates. The movement is driven by the principle that what is lacking is not more mathematics, or deeper mathematics, or greater fluency with mathematics but, rather, a greater flexibility with mathematics—a flexibility to use the mathematics we know to tackle the ever-changing and shifting landscape of life.

> Efforts to intensify attention to the traditional mathematics curriculum do not necessarily lead to increased competency with quantitative data and numbers. While perhaps surprising to many in the public, this conclusion follows from a simple recognition—that is, unlike mathematics, numeracy does not so much lead upwards in an ascending pursuit of abstraction as it moves outward toward an ever richer engagement with life's diverse contexts and situations. (Orrill 2001, xviii)

Numeracy is not mathematics. It is something different. Instead of diving deeper into the formal and abstract world of mathematics, learning more mathematics and becoming more fluent with mathematics, numeracy fosters the understanding and application of our mathematical knowledge in a quantitative sense. Unlike the field of mathematics, which continues to expand, the mathematics needed by a numerate individual is relatively finite. That is, numeracy isn't about being able to flexibly use all of mathematics to

deal with "life's diverse contexts and situations" (Orrill 2001, xviii); rather, it's about being able to flexibly draw on that subset of mathematics that is most useful in dealing with these diverse contexts and situations.

Numeracy as a Toolkit

Numeracy can be seen as a toolkit of mathematical skills:

> [Numeracy] empowers people by giving them tools to think for themselves, to ask intelligent questions of experts, and to confront authority confidently. These are skills required to thrive in the modern world. (Quantitative Literacy Design Team 2001, 2)
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> [A numerate person is able to use] mathematics to make decisions and solve problems in everyday life. For individuals who have acquired this habit, mathematics is not something done only in mathematics class but a powerful tool for living, as useful and ingrained as reading and speaking. (Quantitative Literacy Design Team 2001, 8)

What the skills are that populate this toolkit is debatable . . . and contextual. In mathematics, the toolkit would contain *all* mathematics learned. In numeracy, however, the toolkit contains only those skills that are mastered and that are useful across a wide variety of contexts. So, while a formula for an arithmetic sequence may be the most efficient way to solve a problem, multiplication (or repeated addition) may be the more accessible way to solve it. That is, the formula for arithmetic series is like a specialty tool that, for most people, lies forgotten in a bottom drawer somewhere. Multiplication, on the other hand, is the well-worn, well-used, familiar tool that is easily found near the top of the toolkit. It may not be as elegant or as impressive as the formula for arithmetic series, but it is comfortable, reliable and easily accessible.

This is not to say that we should have a small toolkit. We want to continue to expand our toolkit, to add new tools to our repertoire of familiar mathematical skills that we can use to deal with our ever-expanding set of experiences. But the acquisition of a new tool should come out of necessity and be grounded in the specificity of our experiences. And it should be immediately and repeatedly useful to us. Otherwise it runs the risk of getting lost in the bottom of a drawer somewhere.

Numeracy as a Disposition

But having a toolkit full of well-worn and familiar tools is not enough. A numerate person must also be willing to use the tools to resolve the situation at hand. As such, numeracy is also a disposition—a willingness to engage with the day's problems through the use of mathematical tools.

> Mathematical literacy is an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments, and to engage in mathematics in ways that meet the needs of that individual's current and future life as a constructive, concerned and reflective citizen. (Organisation for Economic Co-operation and Development 1999)
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> [Numeracy is] an aggregate of skills, knowledge, beliefs, dispositions, habits of mind, communication capabilities, and problem solving skills that people need in order to engage effectively in quantitative situations arising in life and work. (International Life Skills Survey 2000)

A handyman is not handy because he has tools; he is handy because he is willing to get his hands dirty using them. Likewise, a numerate individual has to be willing to engage in the work—willing to, when the situation calls for it, pull out his tools and use them.

Numeracy as Stepping Up

Thus, a numerate person is someone who is both willing and able to get the job done. This person knows the tools in his or her toolkit, has the confidence that he or she can get the job done, and is willing to engage in the problems that he or she encounters in work and life.

This has implications for what it is we expect from our students in the context of numeracy. Is the student who uses multiplication to solve a real-life problem more numerate than the one who uses repeated addition? Both students are exhibiting all the qualities of a numerate person implied in the sections above. They are both willing to get the job done. They are both using tools comfortable and familiar to them. The main difference between them is the efficiency of their strategies, but not necessarily their choice of strategy, for the second student may not have multiplication as a tool readily available to choose from. In mathematics we are concerned very much with the choice of strategy, as evolving and abstracting strategy is what moves the mathematics curriculum forward. In numeracy, however, we are much more concerned with stepping up and getting the job done with whatever tools are available to us.

> Numeracy is getting the job done with the tools you have. (Liljedahl 2010)

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