Quantitative Literacy

Steven Khan

One of the obscured rationales for teaching mathematics is that of providing future citizens with the thinking tools necessary for full participation in a modern democracy. A healthy democracy requires large numbers of individuals forming a responsible and informed citizenship, which is capable of reasoning quantitatively in order to make reasonable and responsible decisions relating to personal, professional, and political issues, policies, and practices. Furthermore, in the increasingly technological workspaces and economies in which we and our students will participate, employment potential will be shaped by what and how comfortably and flexibly we are able to learn (or develop) new mathematical ideas, tools, and reasoning. Indeed, as Lynn Arthur Steen and the Quantitative Literacy Design Team state emphatically in *Mathematics and Democracy: The Case for Quantitative Literacy*, "The world of the 21st century is a world awash in numbers … unfortunately, despite years of study in an environment immersed in data, many educated adults remain functionally innumerate."

Reports from regional examining bodies, Ministries of Education, principals, and teachers reveal the inadequate state of mathematical literacy among the school population. This is cause for serious concern. If quantitative literacy (QL) is an essential characteristic of the citizen of the 21st century—one that is needed in order to be able to competently, confidently, and critically contribute to an understanding of the myriad "subtle issues that are communicated in a collage of verbal, symbolic and graphic forms" by agencies and agents with less than altruistic agendas—then the present quality of QL among many of our Caribbean citizens is an ominous portent of the future well-being of our nascent democratic traditions and ecosystems, to say nothing of our economic competitiveness.

Quantitatively literate citizens need to know more than the formulas and equations that characterised most mathematics education in the 20th century. They need to develop a predisposition to look at the world through mathematical eyes, to be able to see and evaluate the benefits and risks of thinking quantitatively about commonplace issues, and must be able to approach complex problems with confidence in the value of careful reasoning. They are empowered to ask and seek answers to difficult questions by demanding access to the data and reasoning upon which public policy is formulated for independent analyses.

Ten elements are proposed as part of a comprehensive portrait of what QL entails. These are: 1) **Confidence with Mathematics;** 2) **Cultural Appreciation** – an understanding of the nature and history of mathematics, including its role in scientific inquiry, technological progress, and understanding issues of public concern; 3) **Interpreting Data** – facility with using data to reach or understand conclusions, draw inferences, and appreciate sources of error; 4) **Logical Thinking** – the ability to reason carefully, analyse evidence, understand and evaluate arguments, interrogate assumptions, and evaluate risks; 5) **Making Decisions** – the ability to use mathematics to make decisions and solve problems that arise in the course of daily activities; 6) **Mathematics in Context** – the ability to use the appropriate mathematical tools in specific settings where the meaning is tied to the context; 7) **Number Sense** – intuitive sense about what numbers mean, confidence in estimation, and common sense when using numbers as a measure of things; 8) **Practical Skills** – facility with the skills needed to solve quantitative problems that arise in everyday life; 9) **Prerequisite Knowledge** – the ability to use a wide range of mathematical thinking tools (algebraic, geometric, statistical, estimation, heuristics, etc.) in a given field; and 10) **Symbol Sense.** If these are to be developed, they must be meaningfully assessed by teachers and examination bodies. Improved attitudes to mathematics and improved mathematics achievement profiles may result.

Finally, QL is not the same as Statistics nor is it watered down Mathematics. Rather, “Quantitative Literacy is more a habit of mind, an approach to problems that employs and enhances both statistics and mathematics.” The goal of QL is to provide more authentic approaches to learning and doing mathematics, as is recommended in curricula documents but enacted too infrequently at the classroom level, where a too-narrow emphasis on antediluvian computational and algorithmic skills is the norm. QL challenges the dominance of the disconnected, de-contextualised, and discretized nature of traditional mathematics instruction, which denies access, agency, and voice to large numbers of learners. These learners consequently fail to develop the power and freedom that being numerate affords, and the quantitative confidence needed to function fully as a citizen in a democratic society. This iniquitous injustice is intolerable. The security and sustainability of our sovereignties, democracies, economies, and ecologies depend on improving the state of our QL.

School of Education, UWI, St. Augustine