

# Symposium Report

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*What is the value and role of communication in mathematics literacy? What does communication in the mathematics classroom look like?*

The objective of MCATA is to provide leadership to encourage the ongoing enhancement of teaching, learning and understanding mathematics. We define *mathematics literacy* as a student's ability to identify and relate to the role mathematics plays in society. Also, literacy involves creating and communicating conjectures, hypotheses and solutions to problems students may encounter in their current and future lives.

Communication is key. Many of us have had the experience of being lost in an unfamiliar city and asking a local for directions. The directions may be very poor, even if the person has driven that route many times. If asked to drive to the destination, the person could. But he or she has failed to communicate directions effectively. Similarly, students coming out of math classes need to know not only how to reach a solution but also how to communicate that solution effectively.

MCATA aims to offer teachers insights and teaching strategies intended to help students master mathematical communication. Simply achieving the correct answer is not sufficient. In a multiple-choice exam, every question is an all-or-nothing deal, and communication is no longer needed. Communication is present in the math classroom when students' creativity is challenged as they solve problems and search for the significance of key concepts. They defend their conclusions and solutions by explaining their reasoning in more than one way. Communication continues between students as they give each other feedback on their work. This communication gives all students an opportunity to improve and enhance their learning and understanding.

MCATA has been providing Alberta's math teachers with current research on mathematical communication, through its publications (papers, brochures, the newsletter and the journal). Alberta Education must also take a leadership role if mathematical literacy and communication are to become the norm in and out of the classroom.

*What is the value of the mathematics diploma exams for Alberta students? In particular, what is the value of the written-response section of the mathematics diploma exams?*

The primary purposes of student assessment are to facilitate student learning, to identify strengths and weaknesses, and to create a decision-making process for student progress. According to Alberta Education, the diploma exams have three main purposes: to certify the level of achievement, to ensure that province-wide standards are maintained, and to report individual and group results. The purposes of assessment and the purposes of the diploma exams do not seem to correspond at all. Large-scale assessment of groups of students is carried out to field test new ideas, create accountability and determine curriculum effectiveness. However, the inferences formed and reported are in reference to the performance of the group, not the individual student.

MCATA is opposed to standardized exams when an exam is not appropriate to the educational needs of the student and when the results are misused. The math diploma exams have become high-stakes exams for all students, constituting 50 per cent of their final mark. Even though teachers will continue to integrate mathematics communication into their practice, they may feel the need to spend considerable instructional time on teaching students how to read and answer multiple-choice and numerical-response questions. This is valuable time that could be spent on improving mathematical literacy.

Here in Alberta, we value what we test. The reality is that organizations such as the Fraser Institute evaluate schools based on diploma exam results. So do parents and school boards. Teachers must balance their desire to help students achieve real learning with the very real threat of scrutiny if diploma exam results are less than desirable.

While a few extra days of instruction in mathematics communication may be helpful, this will not alleviate the heavy pressure of an exam worth 50 per cent. Not every student is good at responding to multiple-choice and numeric-response questions, so the removal of the written-response component from the diploma exams will negatively impact some.

Teachers care about individual students and want them to strive to reach their potential. Also, young people are aware that their performance on the diploma exams will significantly affect their options after high school, and we cannot ignore their needs in this regard.

The numeric-response section may be labelled written response on the exam; however, in numeric response, students merely record their answers on the answer sheet and do not show their work. The answer is either right or wrong, and no partial marks are awarded. Thus, this is still an objective type of exam rather than a subjective one. In an objective test (multiple-choice, true-false or fill-in-the-box questions), there is only one correct response. Everything else is wrong. In a subjective test or written-response section, a student can earn partial credit even for an answer that is incorrect.

MCATA supports the new provincial math curriculum because we believe that it has benefits for students. These include “greater opportunity for conceptual understanding” and “course sequences . . .

designed to prepare students for their future goals.”<sup>1</sup> The first benefit allows students to go deeper into the ideas and concepts of mathematics, and thus allows for intensive understanding. Communication is the key to determining if conceptual understanding and learning have taken place. Written-response questions, therefore, play an enormous role in determining whether students have achieved the second benefit—being prepared for their future goals. Written-response questions allow students to demonstrate critical and creative thinking in the solving of mathematical problems.

MCATA requests that Alberta Education reinstate the written-response section of the diploma exams, using the previous exam format: multiple choice, numeric response and written response—in one exam, in one sitting.

## Note

1. See <http://education.alberta.ca/media/1089846/revisedhsmath.pdf> (accessed January 8, 2010).