

Foreword

U*ncovering Student Thinking in Mathematics, Grades 6–12: 30 Formative Assessment Probes* by Cheryl Rose and Carolyn Arline is a valuable resource for teachers interested in determining how their students think and answer questions in their mathematics classes. The authors have researched many traditional questions and have taken the time and care to write additional items that can be used for both teachers’ own personal formative assessment for how they have taught different topics in their classes and how individual students have understood those topics as well.

The book is organized so that readers know how the probes were built, the reason for their use with students, and what implications might be provided for both the classroom and the student as a result of their use. Much care has been taken by the authors to make this a reader-friendly set of materials.

Through the use of QUEST as defined below, the authors provide a complete implementation process with needed materials that teachers can use.

Questioning student understanding of a particular concept

Uncovering understanding and misunderstandings using a probe

Examining student work

Seeking links to cognitive research to drive next steps in instruction

Teaching implications based on findings and determining impact on learning by asking an additional question.

The probes can be used to differentiate instruction, assess a student’s entry level to a topic, analyze trends in student thinking, and assess the effectiveness of instructional activities. Use of the probes as intended will take a teacher’s time, but that time will be well spent for student learning.

As noted in one section, the use of the probes can help a teacher develop a “sense of a class” when a particular topic is being taught and learned. A teacher asking questions about the primary methods students use, those methods that produce correct responses, the generalizability of the methods, the most efficient of the methods, any outlier methods that could still be fruitful, and using the answers to change instructional strategies can only help the class and concept under consideration.

With a continued use of probes as those presented, teachers can truly assess whether students entering a class or approaching a concept have the needed prior knowledge necessary for learning the concept. Additionally the use of the probes early in the teaching cycle can show a teacher whether students already have an understanding of the concept they are about to study

and if they do have, the alert teacher should be prepared to use very little class time re-teaching what is already prior knowledge for the students.

Of particular import for the teacher is the discussion of traditional questioning in the material. Often teachers allow students to answer questions and use those answers to decide how to move with a class or a concept. Frequently however, the decision may be based only on what is heard from a few students. The use of probes and the “think time” that is suggested with varied responses from students may help provide better information for teacher decision making. This formative use of questioning and probes aligns well with the high level of assessment indicators in the National Council of Supervisors of Mathematics (2008) *The Prime Leadership Framework: Principles and Indicators for Mathematics Education Leaders*: develop and implement “formative assessments that will optimize opportunities for every student to learn” and use “formative assessment processes to inform teacher practice and student learning” (p. 66).

Overall, Rose and Arline have provided a very useful set of materials for teachers in this book. If used as suggested, it should help make for a better student learning experience.

Johnny W. Lott
Professor of Education
Professor of Mathematics
Director, Center for Excellence in Teaching and Learning
University of Mississippi