

Introduction

NCTM firmly believes that all children can learn. At the same time, the Council understands that not all students learn at the same rate or in the same way. In the gradual journey toward mathematical understanding, students may experience difficulties that require intervention. Moreover, some talented students may need opportunities to be accelerated beyond the curriculum that other students follow. This report is designed to provide guidance in the creation or selection of intervention programs that support equitable instructional practices of the highest quality for all students.

An intervention program is a structured plan for providing instructional materials and activities to support students' learning during class time, in programs before or after school, and for use by providers of supplemental services. Instructors can use components of an intervention program or the whole program in working with individuals or groups of students to understand specific concepts and develop skills. Intervention programs are typically designed for struggling students, but they may also be designed to challenge mathematically talented students.

An intervention program can be thought of as a cycle consisting of three phases:

- Diagnostic assessment
- *Instructional actions*
- Follow-up assessment

Diagnostic assessment leads to instructional actions that address students' strengths and weaknesses. These actions in turn lead to follow-up assessment that determines whether the instructional actions have been successful. A diagnostic assessment is a short, targeted, fine-grained examination of the students' knowledge of a particular aspect of mathematics. The instructional actions that follow can occur in a variety of whole-class or one-on-one settings, during the school day, before or after school, in summer school, or with a tutor. The assessment that follows the instructional activities is again short, targeted, and fine-grained, indicating the extent to which the actions have successfully enhanced the students' knowledge. If the intervention cycle is not successful, then further intervention is necessary.

A wide array of intervention possibilities makes the task of creating or selecting an intervention program that will meet the unique needs of students in a school or school district very challenging for teachers and administrators. The decision to develop or use a particular intervention program should be based on an analysis of data on students' strengths and weaknesses from a variety of sources, such as district-mandated tests. In addition, it is crucial that an intervention program be based on research (e.g., research on student learning), both to support the program's design and structure and to allow for rigorous evaluation of its effectiveness on student learning.

In response to a call from the mathematics education community for assistance in creating or selecting effective intervention programs, NCTM has developed a set of questions to guide educators through this complex process. The development of these questions has been guided by research on interventions, including literature on response-to-intervention models, progress monitoring, formative assessment, and cognitive research on student learning.

Creating or Selecting an Intervention Program

Teachers and administrators should consider the following questions in the process of creating or selecting an intervention program:

1. Diagnostic assessment

- 1.1. Does the intervention program include diagnostic assessments that identify students' specific strengths and weaknesses with respect to both conceptual understanding and procedures?
- 1.2. Do the assessments investigate students' knowledge of fundamental mathematics concepts that are grade appropriate?
- 1.3. Does the content that is assessed align with the school's prescribed curriculum?
- 1.4. Do the assessments communicate students' strengths and weaknesses in ways that teachers and parents can understand?

2. Instructional activities

- 2.1. Does the intervention program include a series of instructional activities that are carefully linked with the diagnostic assessments?
- 2.2. Do the program's instructional activities support and enhance, but not supplant or duplicate, regular classroom instruction?
- 2.3. Are tools for ongoing, formative assessment embedded in the instructional activities?
- 2.4. Is the mathematics in the instructional activities correct?
- 2.5. Do the instructional activities advance the school's curriculum and promote reasoning and conceptual understanding?
- 2.6. Do the instructional activities contain challenging tasks that are appropriate for students' interests and backgrounds?

3. Postassessment

- 3.1. Does the intervention program contain postassessments that indicate whether the instructional activities have been effective?
- 3.2. Are follow-up assessments administered in a timely fashion?
- 3.3. Do the assessments communicate students' growth or need for further instruction in ways that teachers and parents can understand?

4. Organizational structure of the intervention

- 4.1. Is the structure of the intervention program feasible given the organizational structure of the school?
- 4.2. Does the school have the necessary resources to implement the intervention program as designed?
- 4.3. Does the intervention program include adequate and ongoing professional development to ensure effective implementation?

5. Research supporting the intervention

- 5.1. Have rigorous and appropriate methods been used to evaluate the intervention program and determined it to be successful?
- 5.2. Does theoretical and empirical evidence support the efficacy of the intervention program in a setting that is similar to your school?

What is the difference between **REMEDICATION** and **INTERVENTION**?

The uses and definitions of *remediation* and *intervention* vary widely. Some consider the terms synonymous and use them interchangeably. Others ascribe different meanings to the terms but do not always distinguish between them in the same way. In fact, programs that some would call *remediation* might, in the view of others, be more properly called *interventions*, and vice versa. This document does not attempt to sort out these conflicting interpretations but adopts the following assumption about the two terms.

Very generally, an intervention can be thought of as a plan of action that an instructor implements on behalf of students who are struggling or who are being considered for acceleration. The term *intervention* usually indicates that the students' difficulties or particular strengths are in the early stages, when they can be identified and possibly addressed before they become a concern. In contrast, *remediation* is often applied to actions taken to reverse established patterns of achievement by students who are already struggling or failing and need intensive and long-term assistance.

The focus here is on intervention, with the goal of helping teachers identify particular strengths or problems early and provide instruction that addresses their students' needs. It is imperative that teachers not wait until students are falling behind before

intervening; rather, they must engage in a continual process of assessing students' strengths and weaknesses, providing or modifying instruction that preemptively targets the students' needs. In essence, intervention naturally supports good instruction.

Interventions involve additional instruction on content that has been introduced in the students' regular classroom mathematics instruction. Intervention is intended to *support*—not supplant or duplicate—regular classroom instruction. Remediation involves supplemental instruction on content that students have previously encountered and were expected to have mastered, but demonstrably have not.

In schools in which the overall mathematics achievement of students is inadequate, a comprehensive system of remediation and selective use of intervention programs, including opportunities for acceleration, may be necessary.