Mathematics Intervention P–3 Framework

Department of Education and Early Childhood Development
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OVERVIEW

The Department of Education and Early Childhood Development recognizes the need for and importance of mathematics intervention for students. Children who successfully acquire mathematics skills in early grades are well prepared to succeed in later grades. On the other hand, children who struggle with mathematics are at a disadvantage. These students often fall behind their peers, continue to struggle in the later grades, and are less likely to pursue post-secondary studies of mathematics or careers involving mathematics. Research shows that providing intervention in the elementary grades has the greatest impact on student success going forward. That said, the instructional techniques that classroom teachers put into practice in elementary years are likely to also benefit the students in higher grade levels.

This Mathematics Intervention Framework is focused on providing intervention to students. It

- has been developed based on educational research and the collective experience and expertise of classroom teachers, specialist teachers, school board personnel, and Department of Education and Early Childhood Development staff
- builds on effective instruction, assessment, and support practices that are already in place in classrooms across the province
- provides support for teachers to enhance and refine their instruction and assessment practices

Early identification of students who struggle with mathematics is crucial to ensuring that they are provided with the necessary supports and intervention to help them succeed now and in later grades.

The approach used for intervention will be evidence-based focusing on identification, concentrated instruction, and intervention practices that will give learners the support they need to boost their mathematical development.

The focus in mathematics in grades primary and 1 should be on effective classroom instruction and assessment, in-class support provided by the classroom teacher, and time for development of initial mathematics concepts. It is suggested, therefore, that the main focus for mathematics intervention should be on grades 2 and 3.

GOAL OF INTERVENTION

The framework is built around the provision of focused support and intervention to meet the student's developmental stage and individual challenges and strengths. Although support and intervention will target gaps in student learning, and so will begin "where students are" in their understanding, the intent of support and intervention is to vertically accelerate students to grade level. Underlying all support and intervention is the development of motivation and perseverance in students to engage in mathematical processes and develop a passion and appreciation for mathematics.

GUIDING PRINCIPLES

The Mathematics Intervention Framework is based on the following guiding principles.

1. **Strong foundation:** Mathematics provides all students with a strong foundation for future success and achievement.
2. **In-depth understanding:** All students can successfully learn mathematics with depth and understanding when provided with effective research-based instruction and a coherent core curriculum.
3. **Teacher experience:** The professional expertise of classroom teachers is crucial to students' ability to succeed.
4. **Ongoing assessment:** Ongoing classroom assessment is critical to monitor the effectiveness of instruction and individual student progress, and to identify those students requiring intervention.
5. **Timely and appropriate:** Intervention must be timely, based on effective assessment and instructional practices, and developmentally appropriate for each student.
6. **Flexible:** Different levels of and approaches to intervention are necessary to help all students learn mathematics well. Flexible approaches for intervention must be used to ensure responsiveness and to meet the needs of small groups and/or individual students as determined by each student's learning profile and developmental progress.
7. **Time to learn:** Intervention requires concentrated blocks of time every day for students to work with a mathematics support teacher.
8. **Classroom strategies:** Intervention provides students with a repertoire of strategies, skills concepts, and procedures, that are transferable to the classroom.
9. **School, board, departmental support:** Collaboration and support from instructional leaders and/or coaches/mentors at school, school board, and department levels is critical to enable classroom teachers in grades primary to 3, and mathematics support teachers for students in grades 2 and 3, to enhance and refine effective instructional and assessment practices, and to respond effectively to students' need for support and intervention.
10. **Collaboration:** Classroom teachers and mathematics support teachers collaborate in joint planning and instructional design in order to meet the learning needs of students through intervention.

Three Levels of Support and Intervention

This framework is designed to provide focused, developmentally appropriate instruction, classroom-based support, and targeted intervention for identified students while immersing them in rich mathematical experiences. Intervention will be the joint responsibility of the classroom teacher, the mathematics support teacher, the school planning team, and the school administrative team.

LEVEL ONE: CLASSROOM TEACHERS

The first level of effective instruction, assessment, and support for all students is provided by the classroom teacher. Through the daily use of research-based instruction and assessment practices, classroom teachers

- provide effective mathematics instruction for all students, including differentiated instruction and adaptations in program delivery as needed
- monitor each student's progress through ongoing classroom assessment to ensure that classroom-based instruction and support are effective
- identify students who are not making progress as expected
- provide immediate classroom-based support for identified students
- collaborate with the school planning team, mathematics support teacher, and school administrative team if an identified student is not progressing as expected despite effective classroom instruction and support
- engage in ongoing professional learning
- utilize the support provided for professional learning through mentoring/coaching
- collaborate and plan with the mathematics support teacher to ensure skills and strategies being taught during intervention are being reinforced and utilized in the classroom

Effective instruction, assessment, and support results in students who are mathematically proficient; that is students who are able to

- demonstrate a deep understanding of the mathematics concepts, procedures, and skills
- demonstrate procedural fluency, including fluency with mental mathematics and estimation
- develop and meaningfully apply mathematical concepts, knowledge, and procedures in problem-solving situations
- connect mathematical ideas to other concepts in mathematics, to everyday experiences, and to other subject areas
- communicate (read, write, listen, and speak mathematically) in order to learn and express their understanding of mathematics
- visualize mathematical concepts in order to process information, make connections, and solve problems

- represent a concept in a variety of ways including concretely, pictorially, linguistically, contextually, and symbolically
- reason mathematically to explain and justify their strategies and solutions
- select and appropriately use technologies as tools for learning and solving problems
- create their own understanding of mathematics through problem solving with manipulatives, social interaction and collaboration, and individual reflection
- demonstrate a positive attitude and perseverance toward mathematics

EFFECTIVE CLASSROOM INSTRUCTION

Effective teaching and learning requires a balanced approach to instruction and assessment. This balanced approach is provided in relation to all five strands of the mathematics curriculum—Number, Patterns and Relations, Measurement, Geometry, and Statistics and Probability. The specific mathematical content for each grade level is prescribed by the outcomes contained within the curriculum documents provided by the Department of Education and Early Childhood Development. Instructional and assessment tasks selected by classroom teachers align with those outcomes and help ensure that all students develop mathematical proficiency.

Effective first-level teaching provides scheduled daily mathematics instruction in accordance with the *Revised Time to Learn Strategy: Grades Primary–Three* (Education and Early Childhood Development 2015), which is available at nsvs.ednet.ns.ca/nsps/nsps26/login/index.php. Classroom teachers in grades primary–2 schedule 75 minutes of daily integrated mathematics instruction and teachers in grade 3 schedule 90 minutes of daily integrated mathematics instruction. It is recommended that daily instruction in mathematics be provided in an uninterrupted block of time.

Effective classroom-based instruction uses research-based instructional strategies in a variety of lesson models—open exploration, guided lessons, and direct instruction—to support a constructivist approach to student learning in mathematics. Each lesson model is selected in response to the content of the outcome to be addressed, the learning styles and needs of the students, and ongoing classroom-based assessment evidence.

EFFECTIVE CLASSROOM ASSESSMENT

A key component of effective classroom instruction is a balanced approach to assessment. Assessment evidence is used to track student progress, inform instructional programming, and aid in instructional decision making. Effective assessment of student learning

- aligns with curriculum outcomes
- clearly defines criteria for success and expectations for performance
- uses a wide variety of assessment strategies and tools (products, observations, and conversations)
- yields useful information to inform instruction

Classroom teachers use their ongoing classroom-based assessment information to make instructional decisions for all students and to identify, in a timely manner, students who are not progressing in their mathematical understanding. Classroom-based assessment tools used by teachers include

- teacher developed classroom-based assessments (using a combination of products, observations, and conversations)
- assessment tasks provided in each grade-level curriculum document
- *Atlantic Canada Mathematics Assessment Resource Entry–3* (CAMET 2010) assessment binders
- *Numeracy Nets K–2* (Bauman 2011) and Numeracy Nets 3 (Bauman 2009), which are available on the "Mathematics Learning Commons P–3" Moodle
- assessments provided through the core resource, *Math Makes Sense*, K–3
- common assessments developed as part of Planning for Student Success
- *Leaps and Bounds toward Mathematics Understanding 3/4* (Small, Lin, Kubota-Zarivnij 2011), which is available on the "Mathematics Learning Commons P–3" Moodle

Additional assessment information is provided to classroom teachers through school, board, and provincial assessments.

CLASSROOM SUPPORT

When students are identified, classroom teachers provide support specific to each student's learning needs. This support may take the form of

- additional opportunities for instruction or assessment
- alternative learning tasks, assessment tasks, or lesson models
- differentiated instruction
- small-group or individual instruction
- scaffolding during learning opportunities
- additional practice or review
- adaptations in program or lesson delivery

LEVEL TWO: MATHEMATICS SUPPORT TEACHERS

Classroom teachers in grades 2 and 3 will identify students who have not responded to classroom-based instruction and support and who are not progressing as expected in mathematics. The classroom teacher will collaborate with the administrative team and/or the school's planning team to determine if additional support, through intervention, will be provided for these identified students. If intervention is determined to be required, identified students will receive a second level of instruction, which will take the form of intervention delivered by a mathematics support teacher.

It is suggested that students identified for intervention be those students who have not already been identified for other support in mathematics, such as an IPP, and who would not typically be served by the program planning process. When selecting students for intervention, the school team should consider each student's learning profile, learning needs, and developmental progress. Other factors may be considered as needed.

Intervention will address the identified gaps in student learning and will

- be timely
- be based on effective instructional practices
- utilize ongoing assessment to monitor student progress and response to intervention
- be developmentally appropriate for each student
- engage students in rich mathematical tasks

Intervention will enable identified students to

- build background knowledge, skills, and procedures through explicit and systematic instruction
- know and apply a repertoire of problem-solving strategies
- develop a student's ability to communicate and reason mathematically
- model and represent mathematical concepts concretely, pictorially, linguistically, contextually, and symbolically
- make connections among mathematical concepts, to real life, and to other subjects
- use mathematics confidently to solve problems

Intervention, provided by the mathematics support teacher, will enable identified students to learn mathematics with understanding and to apply their knowledge effectively in problem-solving situations. Although intervention will target gaps in student learning, and so will begin "where students are" in their understanding, the intent of intervention is to vertically accelerate students to grade level.

It is expected that mathematics support teachers will

- monitor student progress to ensure that interventions and supports are effective, both in the support setting and in the classroom
- provide data on the impact of intervention and support on student learning
- collaborate and plan with the classroom teacher to ensure skills and strategies being taught are being reinforced and utilized in the classroom
- collaborate with the school planning team, classroom teacher, and school administrative team if an identified student is not progressing as expected despite effective intervention strategies
- engage in ongoing professional learning

AREAS OF FOCUS FOR INTERVENTION

Although all strands of mathematics are important, intervention in grades 2 and 3 will focus upon two key areas of mathematics, **Number** and **Patterns and Relations**, which are critical to future success in mathematics.

ASSESSMENT FOR INTERVENTION

To inform instructional decision making and approaches for intervention, the mathematics support teacher will utilize classroom-based assessment evidence collected using assessment tools such as

- teacher developed classroom-based assessments (using a combination of observations, conversations, and products)
- assessment tasks provided in each grade-level curriculum document
- the *Atlantic Canada Mathematics Assessment Resource Entry–3* (CAMET 2010) assessment binders
- *Numeracy Nets K–2* (Bauman 2011) and *Numeracy Nets 3* (Bauman 2009), which are available on the "Mathematics Learning Commons P–3" Moodle
- assessments provided through the core resource, *Math Makes Sense*, K–3
- common assessments developed as part of Planning for Student Success
- *Leaps and Bounds toward Mathematics Understanding 3/4* (Small, Lin, Kubota-Zarivnij 2011), which is available on the "Mathematics Learning Commons P–3" Moodle
- Summative Assessments for Intervention (Department of Education and Early Childhood Development forthcoming) available on the "Mathematics Intervention" Moodle

The mathematics support teacher may also utilize school, board, and provincial assessment information.

Regardless of the assessment tools used, the evidence collected will identify the specific areas of need and strength for each student. This information will be used to determine learning strategies and interventions, and to support instructional planning in this second level of instruction. The evidence collected will also form the baseline data needed to track student progress.

In addition to the ongoing collection of formative assessment data, they will collect summative assessment data at the end of each block of intervention in order to assess the progress of each student receiving intervention. This data will be used to determine the effectiveness of intervention in closing the achievement gap for identified students.

STRATEGIES FOR INTERVENTION

Classroom teachers will work with mathematics support teachers to tailor instruction and assessment to meet the needs of their identified students, based on each student's learning profile. This focused, individual approach to mathematics intervention will ensure that mathematics challenges are addressed before they become entrenched, and before they affect the student's confidence. It will also allow teachers to build on the individual strengths of each student and what each student has under control, to keep students motivated as they progress in their learning. For example, if a student has good number sense for numbers to 100 but poor understanding of the meaning of addition and subtraction, teachers will choose instructional strategies that reinforce the student's strengths with numbers to 100, while building their abilities in addition and subtraction. In this way, students will work to improve their mathematical abilities while seeing themselves as successful learners.

To design intervention lessons, mathematics support teachers will draw upon appropriate curriculum documents; instructional practices described within the outline of effective level one teaching; professional resources for instruction and intervention including works by John Van de Walle and Dr. Marian Small; the background and strategies for intervention provided within the Leaps and Bounds resources, and professional learning provided through school board and Department of Education and Early Childhood Development staff.

MODELS FOR INTERVENTION

Intervention may be provided in an individualized manner to one student at a time. However, when similar needs and gaps in learning have been identified among a group of students, intervention may be provided to a small group of two or three students. The benefit of a small-group approach to intervention is the opportunity for identified students to collaborate, communicate, and problem solve with peers.

Intervention may occur within the classroom or in an alternate setting as determined by the learning needs of the student(s). Intervention for students may be delivered in the classroom during regularly scheduled mathematics class time, outside of regular mathematics class time in a pull-out model, or a combination of these times. The decision about the delivery model and timing should be based upon the student's learning profile, learning style, and identified learning needs. Other considerations include classroom structure, age of the student, the number of students requiring intervention, topics being addressed in the regular mathematics classroom, and topics identified for intervention.

Regardless of the delivery model selected, maintaining the continuity between classroom instruction and specific, focused interventions is crucial. Students must be able to transfer strategies and skills learned in the classroom to the work addressed during intervention time, and must be able to transfer the strategies and skills learned during intervention to the classroom learning environment.

SCHEDULING INTERVENTION

When scheduling intervention lessons, the following should be considered:

- Thirty minutes daily for individual intervention.
- Forty-five minutes daily for small-group (two or three students) intervention.
- All lessons will contain ongoing assessment of student progress.
- Blocks of up to six weeks of intervention will be provided for each student or group of students.
- At the end of the block of intervention, students will be re-assessed to determine if intervention has addressed the identified need.
- If progress has not been made, the classroom teacher, mathematics support teacher, school planning team, and school administrative team will collaborate to determine whether
  - an additional block of time is needed with the mathematics support teacher
  - the classroom teacher can provide the necessary support
  - an additional third layer of support is necessary for the student

As much as possible, the impact of mathematics intervention on learning in other subjects should be minimized. If the decision is made to provide intervention outside the regular mathematics class, the impact on other subjects may be minimized by rotating the 30 or 45 minute block of time throughout the day over the period of intervention to help ensure the student does not always miss the same subject each day.

As much as possible, the time for intervention should be in addition to, rather than instead of, regular classroom instruction in mathematics. A flexible approach to delivery and scheduling, responsive to the needs of the identified student, is recommended. The intent is to provide intervention in mathematics while, at the same time, maintaining the integrity of other subjects and the *Revised Time to Learn Strategy: Grades Primary–Three* (Education and Early Childhood Development 2015).

IMPORTANCE OF COLLABORATION

The classroom teacher and the mathematics support teacher will meet at regular intervals for instructional planning sessions to ensure that classroom instruction, classroom support, and intervention are the best match for the student's mathematics development, as determined by ongoing assessments. Classroom teachers and mathematics support teachers will also consult regularly with resource teachers, who may be able to provide additional expertise and/or support.

STAFFING MATHEMATICS SUPPORT TEACHER POSITIONS

In order to maximize the positive impact of intervention, it is recommended that mathematics support be prioritized and provided to schools whose students demonstrate the greatest need for intensive support and intervention. Need should be determined through the use of student achievement and other data available to classrooms, schools, and school boards. Evidence to support decision making about allocation of mathematics support may include:

- classroom-level assessment data
- school-level Student Success Planning data
- school board-level data including assessments, report cards, student services, demographics, and staffing
- provincial-level assessment data

Each board has flexibility in assigning the role of mathematics support teacher. Although it is recommended that mathematics support teacher positions be staffed as full-time 100% positions, they may be staffed as percentage positions. School boards should consider the following when making the decision about full-time versus percentage positions for mathematics support teachers:

- the needs, learning styles, and learning profiles of identified students
- requirement of daily blocks of time for intervention
- the need to flexibly assign time for intervention to minimize impact on other subjects
- the ability of the mathematics support teacher to provide timely intervention
- maximizing the use of FTE allocation in order to support as many students as possible
- the need for time for classroom teachers and mathematics support teachers to collaborate and share information about student learning

- flexibility of teacher schedules and demands on teacher time
- size of schools and the population of students identified for intervention within each site
- proximity and travel time between schools
- bell times and scheduling
- availability of teachers to provide intervention
- training needed for mathematics support teachers
- need for a cohort of well-trained mathematics support teachers
- need for a sense of professional identity and professional community among mathematics support teachers—important factors for adult learners to help create shared focus, shared learning, and continuity of program delivery
- substitute costs for training if positions are percentage positions
- other factors deemed important within the context of the board

LEVEL THREE: ALTERNATIVE SUPPORT AND INTERVENTION

A third level of intensive intervention may be deemed necessary for students who have not made progress despite the provision of effective classroom-based instruction and support (Level 1), and intervention from the mathematics support teacher (Level 2). In Level 3, a referral to the school's planning team may be necessary to determine if additional support or further investigation is required.

ROLES TO SUPPORT IMPLEMENTATION OF THE FRAMEWORK

Effective mathematics instruction does not happen in isolation. The classroom teacher and the mathematics support teacher must work in partnership with parents and families, learning and instructional leaders, and mathematics mentors/coaches at the school, school board, and department levels. This Mathematics Intervention Framework recognizes the importance of a system-wide, supportive approach to mathematics instruction.

The Mathematics Intervention Framework is designed to provide flexible supports to students who require more intensive mathematics instruction. The implementation of the intervention framework, and related learning for teachers and teams will be the joint responsibility of school board staff, mentors/coaches, and Department of Education and Early Childhood Development staff.

ROLE OF SCHOOL-BASED ADMINISTRATORS

Administrative support at both the school and school-board level is vital for this Mathematics Intervention Framework to be successful. School-based administrators must ensure that the time allocated for classroom and mathematics support teachers to work with students is protected. They must also work with board mathematics leaders to ensure that teachers have the resources they need in order to provide their students with timely, effective classroom support.

ROLE OF SCHOOL BOARD LEADERS

School board leaders will work with the Department of Education and Early Childhood Development to identify additional resources to support mathematics instruction, assessment, and intervention. For example,

- mathematics support teachers may require training on the administration of assessments, Leaps and Bounds assessments and intervention resources, and/or on the intervention strategies required to support student learning
- classroom teachers may require support in using Numeracy Nets or Leaps and Bounds or in developing effective classroom-based assessments
- resource teachers may require support in using Leaps and Bounds to provide support to students

School board leaders will be responsible for monitoring the progress of students and the success of intervention strategies. School boards will collect data on the impact of intervention on student learning and will provide an annual summary report to the Department of Education and Early Childhood Development to support provincial-level reporting of student success. The data will identify the specific grade-level outcomes with which identified students struggled prior to intervention, and the level of achievement of those outcomes after intervention as determined by summative assessments developed by the Department of Education and Early Childhood Development.

School board leaders will also develop and implement plans to address the professional learning needs of mathematics support teachers and classroom teachers, calling upon the Department of Education and Early Childhood Development to provide targeted support. As much as possible, the professional learning needs of classroom teachers will be addressed through site-based activity, including mentoring/coaching, and Student Success Planning endeavors that encourage and support teacher reflective practices. Additional professional learning may be provided at the regional level if needed.

ROLE OF DEPARTMENT OF EDUCATION AND EARLY CHILDHOOD DEVELOPMENT

In addition to providing a framework for intervention, the Department of Education and Early Childhood Development will

- develop grade-level summative assessments for grades 2 and 3 for Number and Patterns and Relations—the strands targeted for intervention (These summative assessments will be used by mathematics support teachers to determine the impact of intervention on targeted outcomes.)
- create an online repository of resources for mathematics support teachers
- create an online data collection system in order to monitor the use, impact, and success of intervention on the learning of identified students

The Department of Education and Early Childhood Development will provide professional and student learning resources to support the work of schools and school boards in implementing the Mathematics Intervention Framework. Department staff will work closely with all partners to provide mathematics support teachers with the resources and training they need to provide quality mathematics instruction and timely, coordinated intervention for identified students.

Department staff will support school boards in working with classroom teachers, mathematics support teachers, and school board staff to help develop a collaborative school-based approach to mathematics intervention. This will involve providing on-site support to teachers.

Department staff will work closely with partners in education to identify new, promising practices and resources to support the work of classroom and mathematics support teachers, as well as the instructional leaders in the school. Department staff will also provide classroom teachers, mathematics support teachers, school-based administrators, and school board staff with up-to-date research and materials to ensure they have the best resources to support student learning. This will include training for mathematics support teachers on the use of Leaps and Bounds and other intervention resources and strategies. The Department of Education and Early Childhood Development will be available to provide other focused services as requested by individual school boards.

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