

TIPS

for English Language
Learners in Mathematics

Grades 7, 8, 9 Applied, 10 Applied

TIPS for English Language Learners in Mathematics: Grade 7, Grade 8, Grade 9 Applied, and Grade 10 Applied is designed to be useful to teachers in both Public and Catholic schools, and is intended to support beginning teachers, provide new insights for experienced teachers, and help principals and professional development providers as they work to improve mathematics education.

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Developing Mathematical Literacy for ALL

Developing Mathematical Literacy for ALL... A Focus on English Language Learners

Introduction

The term *English language learner* is used in this resource to identify students who require support with the English language. English as a Second Language (ESL) and English Literacy Development (ELD) refer to the programs that provide the support English language learners need to be successful learners in Ontario schools. Recent research and developments in other jurisdictions suggest that the term *English language learner* more accurately describes these students and reflects a shift in thinking about them.

The Expert Panel Report *Leading Math Success: Mathematical Literacy, Grades 7–12* reminds us that “All students can learn mathematics – with enough support, resources, and time – and we must ensure that they do” (p. 11). Educators need to have examples for supporting these language learners using resources and providing time for English language learners to do their best in meeting appropriately high standards in mathematics.

TIPS for English Language Learners in Mathematics offers support for teachers of English language learners in Grade 7, Grade 8, Grade 9 Applied, and Grade 10 Applied Mathematics. It is built on and aligned with *Targeted Implementation and Planning Supports for Revised Mathematics: Grade 7, Grade 8, Grade 9 Applied, and Grade 10 Applied*, 2005 (*TIPS4RM*). This resource contains models for adjustment of instruction for pairs, small groups, or the entire class and ways of differentiating instruction and assessment for English language learners so they can achieve literacy and mathematics goals. These adjustments in student groupings, teaching strategies, timing, and materials are based on recent research of ways to support English language learners.

“ESL students usually require at least 5 years of exposure to academic English to catch up to native-speaker norms. In addition to internalizing increasingly complex academic language, ESL students must catch up to a moving target... ESL students must make 15 months’ gain in every 10-month school year.”

(Collier and Thomas 1999)

This resource includes pre-planned lessons for English language learners who have grade-appropriate mathematics and literacy backgrounds in their first language. It is intended to:

- support beginning teachers;
- provide new insights for experienced teachers;
- help principals and professional development providers as they work to improve mathematics education for all students, focusing on English language learners.

To address the gaps in mathematics and in literacy for English language learners who have little experience with mathematics or with schooling in general, teachers will need to make further adjustments to address English literacy development (ELD) goals and observed student needs.

Teachers of mathematics are best positioned to deliver the supports students need for developing and practising the academic language needed for learning mathematics. However, there are challenges in developing this academic language:

- Students do not pick up academic English subconsciously by talking to their friends, because academic English is not used in casual conversations.
- While conversational English makes almost exclusive use of listening and speaking, academic English also requires extensive use of reading and writing.
- Accurate use of grammar and vocabulary are critical in accurate communication of reasoning and other processing skills in academic writing.
- In academic English, persuading, arguing, and hypothesizing are more important than telling narratives.

The intent is to help teachers of mathematics:

- develop instructional practices that allow multiple entry points and multiple pathways to mastering content knowledge while promoting academic language development;
- explicitly teach the academic language for learning mathematics to all students and reinforce connections repeatedly for English language learners;
- identify English language learners' prior mathematics and language knowledge/skills and plan and deliver classroom instruction/assessments accordingly.

Key Messages

There are important messages in *TIPS for English Language Learners in Mathematics* for the many stakeholders involved in the mathematical education of the young adolescent English language learners.

For Teachers

- Establish a classroom climate that welcomes and supports English language learners. For example, encourage English language learners with sufficient oral language skills to share how classrooms and expectations differ in their home countries. Be sensitive to students who may not have been attending school in their home countries. If possible, pair English language learners with a first-language peer who also speaks English.
- Plan and deliver classroom instruction and assessments that incorporate the key messages for learning mathematics:
 - Value mathematics.
 - Incorporate cooperative learning.
 - Implement appropriate classroom management strategies.
 - Attend to the whole student.
 - Use flexible groupings of students.
 - Make explicit links to literacy.
 - Focus on important mathematics.
 - Make learning active.
 - Make available a rich array of manipulatives and technologies.
 - Focus on assessment *for* learning as well as assessment *of* learning.
 - Provide enough time for students to learn.
 - Differentiate curriculum factors during instruction and assessment based on student factors.
- Work with ESL/ELD resource teachers to plan for and support individual English language learners, e.g., work with the ESL/ELD teacher to learn some teaching techniques such as word walls and choral repetition of new words.
- Work collaboratively with all teachers of English language learners by:
 - planning and sharing information with other teachers about academic progress and participation;
 - sharing ideas about effective ways of helping particular students become familiar with the vocabulary and concepts of mathematics.
- Demonstrate sensitivity to cultural norms by:
 - adjusting teaching strategies to respect customs, e.g., English language learners may come from a culture where it is inappropriate for students to directly ask teachers for help, make eye contact when speaking to another, or express one's opinion supported by evidence of thinking;
 - reviewing problems for cultural 'hot spots,' e.g., references to holidays that may not be part of English language learners' culture.

Teachers should choose strategies that are most suited to the students' needs as they progress along the continuum of learning language and understanding mathematics concepts.

- Communicate with parents of English language learners, through interpreters, if available.
- Use appropriate groupings to help learners achieve both their goals for learning math and for learning language:
 - Pair or group English language learners with peer tutors who understand the mathematics, the newcomer’s first language, and English.
 - Group an English language learner with first-language peers who speak English and who are all learning the mathematics.
 - Pair English language learners where one understands the mathematics and the other does not, even though both are learning academic English.
 - Group English language learners with English speakers who will include them in the task.
- Engage all students in mathematical activities that develop mathematical thinking. Some teachers tend to excuse English language learners from certain aspects of the academic work in order to not damage their self-esteem. Berzins and Lopez (2001) describe this as the *pobrecito* (poor little one) syndrome. However, carefully combining elements of language learning with mathematics learning is at the heart of effective language learning, and is related to what Slavin and Calderon (2001) call “component stacking.” The following types of mathematical activities allow for development of both mathematics and language:
 - Computing
 - Recalling facts
 - Manipulating
 - Using manipulatives and technology
 - Exploring
 - Hypothesizing
 - Inferring/concluding
 - Revising/revisiting/reviewing/reflecting
 - Making convincing arguments, explanations, and justifications
 - Using mathematical language, symbols, forms, and conventions
 - Explaining
 - Integrating narrative and mathematical forms
 - Interpreting mathematical instructions, charts, drawings, graphs
 - Representing a situation mathematically
 - Selecting and sequencing procedures
- Use strategies that help students develop and practise academic language for learning mathematics.

“To teach an unknown concept, use the known language.

To teach an unknown language, use a known concept.”

(Kerper Mora 2004)

Oral Strategies

- When speaking, simplify sentence structure and provide direct instructions.
- Use jargon, idiomatic speech, and figurative language sparingly, and explain the meaning when you do use it.
- Model language/vocabulary you expect students to use.
- Explain homophones that are used, e.g., pi/pie, plane/plain, rows/rose, sine/sign, sum/some.
- Provide opportunities for students to practise mathematics vocabulary using a variety of strategies. (See *Think Literacy: Cross-Curricular Approaches: Mathematics.*)

Visual Strategies

- ❑ Write key words on the board or on a flip chart while discussing them.
- ❑ Connect verbal, written, and pictorial representations of the same word.
- ❑ Identify language that might confuse English language learners because the words mean one thing in everyday conversation and another in mathematics, e.g., create a table, determine the volume, and review those terms prior to teaching the math lesson.
- ❑ Make available vocabulary/language supports that make use of first language, e.g., charts, dictionaries, Word Walls.
- ❑ Have English language learners keep a personal word study notebook that includes key words from each lesson. Drawings, symbols, and words in their first language are appropriate additions to the vocabulary list.
- ❑ Explain structural patterns found in expository text, e.g., sequence, problem/solution.
- ❑ Teach strategies in reading mathematics text, e.g., directionality.
- ❑ Guide students through text before reading and have them focus on headings, subheadings, charts, graphs, visuals, symbols, etc.
- ❑ Point out contextual clues that help with meaning, e.g., words such as *table* and *operation* have a different meaning from everyday language.

Instructional Strategies

- ❑ Teach key vocabulary explicitly and reinforce it on an ongoing basis.
- ❑ Post symbols with word definitions and examples to clarify meaning.
- ❑ Explain strategies and steps for completing instructional tasks and check for student understanding before students start the task independently. Present numerous examples of concepts being taught.
- ❑ To reinforce concepts and vocabulary:
 - incorporate the systematic use of visuals and graphic organizers, e.g., Frayer model for definitions, T-charts and Venn diagrams for relationships;
 - move from concrete to visual to abstract representations when teaching and when asking students to present their solutions.
- ❑ Make strategic use of the learner's first language to set the context for introducing new concepts.
 - If possible, have a peer or resource teacher use levels of English with which students are fluent, while simultaneously using the students' first language.
 - Provide access to materials written in their first language, where possible, to support English language learners' literacy and cognitive development (Hakuta 2001).

Scaffolding Strategies

Scaffold for English language development as well as for development of mathematical skills and concepts, remembering that language goals and curriculum expectations are for the end of the stage or program, and that it is possible to nurture incremental movement towards the goals. See Scaffolding, p. 31, from *TIPS4RM*.

- ❑ Have students restate other students' comments, asking a question, or adding their own idea;
- ❑ Demonstrate your thought process using vocabulary English language learners understand;
- ❑ Post sentence prompts for English language learners to use as they learn new academic language;
- ❑ Have students use manipulatives and technology as thinking tools;
- ❑ Have students use word maps, Word Walls, personal word study notebooks, posters, and labels;
- ❑ Use questions to help English language learners sort out what they understand and what they need to learn next;
- ❑ Encourage English language learners to use graphic organizers, diagrams, gestures, and sketches to aid in thinking and communicating with others;
- ❑ Correct errors judiciously and give positive feedback using prompts, gestures, encouragement, and praise;
- ❑ Provide handouts that help students structure and guide their work, e.g., skeleton notes and summaries.

Assessment Strategies

- ❑ Gather as much data as possible about students' prior knowledge and experiences to help them make connections to new learning.
- ❑ Take into account specific gaps that might exist in English language learners' mathematical knowledge and experience.
- ❑ Prepare students for lessons by incorporating strategies that activate and assess prior knowledge, e.g., brainstorming, providing analogies, organizers such as K-W-L (Know-Wonder-Learned) charts, T-charts, Venn diagrams, flow charts.
- ❑ Check for accuracy of prior knowledge.
- ❑ Recognize that concepts or ideas learned in any language can be transferred to English.
- ❑ Connect new knowledge to previously acquired skills and concepts.
- ❑ Help students use mathematical tools with which they might be unfamiliar, such as calculators, rulers, and computer software programs.
- ❑ Check for understanding by observing their body language and facial expressions.
- ❑ Apply assessment practices that are good for all students, and that can be adjusted for English language learners:
 - Use a wide variety of assessment strategies, such as performance tasks and conferences, that allow students to demonstrate their understanding in ways other than through reading and writing.
 - Observe students as they work in groups and provide encouragement for interaction and contribution.
 - Conduct frequent briefing sessions to discuss difficulties resulting from a lack of understanding of the language, e.g., clarity of directions.
 - Use assessment information to guide further instruction to help students acquire the language skills needed to understand the math.
 - Provide timely and frequent feedback on their growth in language.
 - Teach self-evaluation strategies and involve students in self-monitoring their own learning.
 - Guide students in acquiring self-monitoring skills that help them identify difficulties they have in understanding what they know, need to know, and do.
- ❑ Differentiate assessment by adjusting assessment tools and strategies to meet the needs of English language learners.
- ❑ Provide alternatives to written tests, e.g., oral tests.
- ❑ Have English language learners complete graphic organizers and cloze activities for assessment tasks that depend heavily on proficiency in written English.
- ❑ Provide bilingual dictionaries (first language/English), or allow English language learners to use their personal word study notebook, when taking tests.
- ❑ Provide alternatives to oral presentations, e.g., using presentation software.

For Principals

- Ensure that there are procedures/supports for registration of English language learners, e.g., interpreters, extra secretarial support, a ‘welcome book,’ a welcomer/ambassador club, copies of and website references for *Newcomer’s Guide to Schools in Ontario*, available in 20 languages: www.settlement.org.
- Establish a school environment that welcomes, values, and supports English language learners and their parents so that all students see themselves reflected in:
 - formal displays and classroom bulletin boards;
 - holiday announcements;
 - school choir repertoires;
 - committees, clubs, teams.
- Expect mathematics classrooms for English language learners to be active places where you can hear, see, and touch mathematics and where you hear English language learners communicating in both their first language (if more than one student speaks the first language) and in English.
- Support teachers in providing an effective mathematics program for English language learners by making available:
 - student and teacher resources;
 - time for teachers to collaborate and share ideas with other teachers and with ESL resource staff;
 - professional learning opportunities targeted at supporting English language learners.

For Coordinators

- Make explicit to teachers how and why certain strategies particularly support English language learners.
- Support mathematics teachers who teach English language learners.
- Support ESL/ELD resource teachers who help students with mathematics.
- Work collaboratively with ESL/ELD coordinators/consultants.
- Provide professional learning opportunities for all teachers to learn about the strategies that support English language learners and how/why specific strategies are critical for English language learners’ success.

Program and Lesson Planning Supports

Interpreting the Lesson Planning Template





This package is based on the mathematics program planning contained in *TIPS4RM*. The **MATCH** (Minds On, Action, Timing, Consolidate, Home Activity or Further Classroom Consolidation) lesson planning template is augmented to include English language learner considerations. The MATCH acronym reminds teachers that English language learner research must be considered in lesson planning for classes that include English language learners.

The English language learner lesson planning template shows teachers how they can take effective mathematics lessons from a variety of resources and adjust them for English language learners. Examples in this resource are taken from *TIPS4RM* (2005).

At the top of each English language learner lesson planning template are:

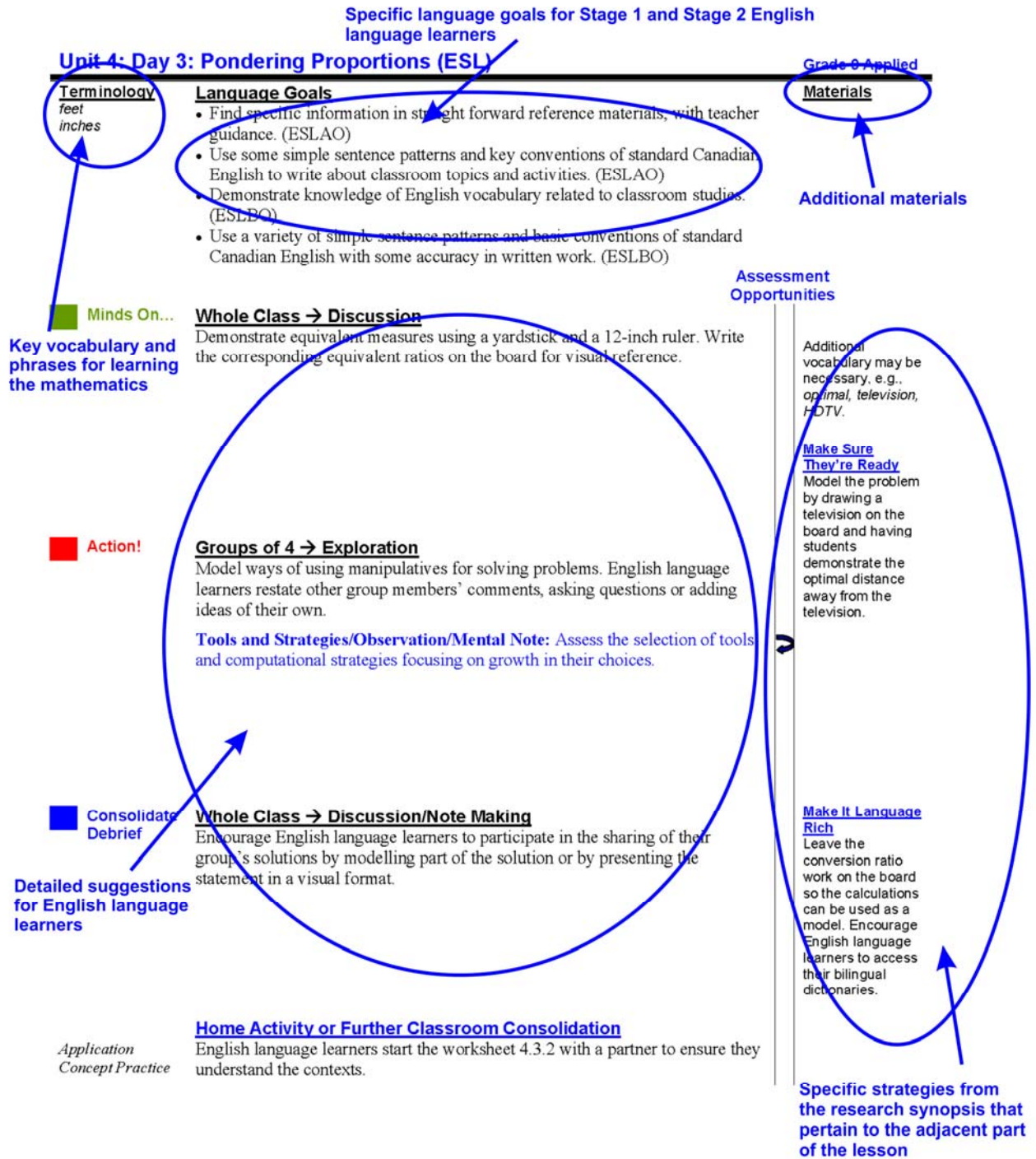
- **Terminology** suggested for the lesson;
- **Language Goals** to add to existing mathematics goals;
- **Materials** suggested for English language learners. Worksheets have been adjusted, where appropriate.

Suggestions for supporting English language learners are provided for each lesson's related activities. Details in the right-hand margin connect the adjustments to research.

-  **Minds On...** suggests how to get students mentally engaged in the first minutes of the class and establishes a positive classroom climate, making every minute of the math class count for every student.
-  **Action!** suggests how to group students and what instructional strategy to use. The teacher of English language learners may need to change the original instructional strategy or suggest an alternate grouping to better engage English language learners. This section suggests how the teacher can facilitate development of academic English as well as mathematical concepts and skills. Suggestions for scaffolding are included, as appropriate.
-  **Consolidate/Debrief** suggests ways to 'pull out the math,' and check for conceptual understanding, and to prepare English language learners for the follow-up activity or the next lesson.
-  **Home Activity or Further Classroom Consolidation** suggests meaningful and appropriate follow-up for English language learners that may be different from what is assigned to other students. Interact with English language learners to ensure that they have correctly interpreted the assignment.

Interpreting the Lesson Planning Template

Word Lesson Template



Research Base for Planning Templates

The adjustments illustrated in sample lessons show teachers how they can start with a *TIPS4RM* lesson and consciously target areas where the research says English language learners can best be supported. Detailed explanations are outlined in *A Practical Guide to Supporting English Language Learners* (see p. 16).

Examples illustrate how teachers can proactively establish a positive classroom climate, provide meaningful instruction, and deliver targeted support for English language learners. Examples illustrate how teachers can demonstrate their commitment to equity by applying instructional and assessment strategies that are good for all students and are particularly supportive of English language learners.

Considerations about Language Learning

- Students are moving along a continuum of language learning.
- The rate at which students move from one stage to the next will vary with the individual student.
- Students may demonstrate skills associated with more than one stage at the same time.
- In the early stages of acculturation and language acquisition, there are periods of rapid growth as well as times when the student may experience a ‘silent period’ or plateau. During such silent periods, the student is absorbing large amounts of linguistic and cultural information but is not yet ready to produce oral language, especially in front of the class.
- Most students in ESL/ELD programs are able to use English to communicate in social situations and day-to-day classroom interactions within one or two years. However, students may require several more years to develop the ability to understand the academic language used in textbooks and to use English to express the increasingly complex and abstract concepts encountered in the higher grades.

“One of the great things about math textbooks is that the writing is brief and to the point. There are no extra words. On the other hand, one of the worst things about math textbooks is that the writing is brief and to the point. This means that each word – no matter how small or simple – counts for a whole lot.”

(Reader’s Handbook, Great Source Education Group, Inc., p. 177)

Curriculum Expectations and English Language Learners

The sets of mathematics curriculum expectations addressed in selected *TIPS4RM* units and lessons for Grade 7, Grade 8, Grade 9 Applied, and Grade 10 Applied have been adjusted for Stage 1 and Stage 2 English language learners. In all cases, the intent is to adjust the expectation for its language demands, but not to modify the depth or rigour of the mathematics.

Stage 1 focuses on using English for daily interactions. Stage 1 English language learners (receiving ESL support) are becoming familiar with the sounds, rhythms, and patterns of English. They try to make sense out of messages, and they show some limited comprehension of “chunks” of language. Their understanding depends on visual aids. They often respond non-verbally or with single words or phrases. English language learners who have had limited access to schooling (receiving ELD support) and have significant gaps in their education can read and comprehend simple written Canadian English in Stage 1, and they are just beginning to write using simple structures.

English language learners in a mathematics classroom are at various stages of English language acquisition and progress at different rates.

Stage 2 focuses on using English in supported and familiar activities and contexts. The Stage 2 English language learners listen with greater understanding and use everyday expressions independently. They demonstrate growing confidence and use personally relevant language appropriately. English language learners receiving ELD support can listen with greater understanding and use everyday expressions independently at Stage 2, and they will demonstrate growing confidence and use of personally relevant language.

English language learners (**receiving ESL support**) at Stage 1 and Stage 2 may exhibit the following skills as outlined in *English As a Second Language and English Literacy Development: A Resource Guide*, 2001 (pp. 38–42):

Listening	
Stage 1	Stage 2
Students understand basic spoken English. They:	Students understand key information presented in highly supportive contexts in a variety of settings. They:
<ul style="list-style-type: none"> follow simple directions with support from visual cues respond to short, simple questions respond briefly to short, simple stories, songs and poems respond to familiar conversational topics using single words and phrases respond to gestures, courtesies, tones of voice, and basic classroom instructions 	<ul style="list-style-type: none"> participate in conversations on familiar topics respond to vocabulary, questions, and instructions in a familiar context request clarification when necessary respond appropriately to body language, tone of voice, pauses, stress, and intonation understand key vocabulary and concepts related to specific subjects or themes understand main ideas in visually supported oral presentations containing familiar vocabulary

Speaking	
Stage 1	Stage 2
Students speak English for basic communication. They:	Students speak English with increasing spontaneity and accuracy. They:
<ul style="list-style-type: none"> • use short, patterned questions to seek information • share personal information and experiences • express basic needs (e.g., related to washroom, safety) • identify familiar names, objects, and actions • answer specific questions using single words or short phrases • speak with sufficient clarity for teacher comprehension • begin to use (with assistance) subject-predicate order, simple verb tenses, negatives, questions, plurals, pronouns, adjectives, adverbs, common contractions, and basic prepositions of location and direction • imitate some English stress and intonation patterns • use everyday gestures and courtesies to convey meaning • perform simple oral presentations (e.g., role plays, dialogues) 	<ul style="list-style-type: none"> • ask questions • participate in social and academic discussions using short phrases and short sentences • recount familiar events, stories, and key information • give straightforward directions and instructions • express opinions, emotions, wishes, and needs • speak with sufficient clarity and accuracy for listener comprehension • speak at almost the pace of first-language speakers, showing some control of stress, timing and rhythm • use (with some accuracy) common tenses, adjectives, adverbs, conjunctions, prepositions of direction and time, and common idioms

Reading	
Stage 1	Stage 2
Students read and comprehend simple written English. They:	Students read for specific purposes when background knowledge and vocabulary are familiar. They:
<ul style="list-style-type: none"> • recognize the alphabet in both print and script • apply sight recognition, phonetic, predictive, and contextual reading strategies • recognize frequently used classroom vocabulary • begin to acquire English vocabulary in all subject areas • identify the main ideas of simple passages with familiar vocabulary and supporting visual cues • follow brief written instructions • use learners' and bilingual dictionaries • use alphabetical order • use reading materials for enjoyment and adapted school projects, with assistance 	<ul style="list-style-type: none"> • use reading strategies to assist in deriving meaning (e.g., predicting, deducing, inferring, rereading, phonics, recognition of cueing systems, repetition, and word families) • begin to use vocabulary-acquisition strategies (e.g., recognize changes caused by addition of prefixes and suffixes, hypothesize meaning of unfamiliar vocabulary in a familiar context, use an English dictionary and thesaurus) • understand short, simple phrases and sentences, instructions, and brief notes in material with familiar vocabulary and context • identify main ideas and key information in text • extract information from textbooks, resources, and dictionaries, using headings, margin notes, index, glossary, graphic organizers, etc. • begin to show some fluency in oral reading • choose and read books for a variety of purposes, including enjoyment

Writing	
Stage 1	Stage 2
Students begin to write using simple English structures. They:	Students write in a variety of contexts using simple English structures. They:
<ul style="list-style-type: none"> • produce the English alphabet in legible cursive and printed form using left-to-right progression and writing on the line • copy blackboard notes and text accurately • begin to apply knowledge of basic writing conventions (e.g., punctuation, spelling, capitalization) • begin to use simple verb tenses, questions, plurals, and common prepositions of location, direction, and time • write short, coherent, patterned compositions (e.g., short journal entries, lists) on personally relevant topics • begin to use acceptable notebook formats appropriate to subject areas, using titles, dates, charts and graphs 	<ul style="list-style-type: none"> • begin to make notes, with assistance • begin to use common tenses, spelling, capitalization, and punctuation, with some accuracy • use conventional spelling for common and personally relevant words • write appropriate responses (using short sentences, phrases, or graphic organizers) to written questions based on familiar academic content • begin to use a variety of forms of writing (e.g., short journal entries, notes, dialogues, poems, narratives, reports) • use the writing process, with assistance, producing a final edited copy that is changed from the first draft • use computers to begin to develop word-processing skills

Orientation	
Stage 1	Stage 2
Students begin to adapt to the new environment. They:	Students demonstrate understanding of and adaptation to the new environment. They:
<ul style="list-style-type: none"> • find personally relevant school locations independently • begin to adapt to a variety of teaching strategies used in a Canadian classroom • begin to respond to social situations appropriately • demonstrate awareness of cultural differences and show pride in self and culture • begin to use community resources, such as banks and stores • begin to work with a partner on a common academic task • communicate critical needs to school staff and peers • understand and follow essential school schedules, behaviour expectations, routines, and emergency procedures • rely on the home language and culture to think, communicate, and process new experiences 	<ul style="list-style-type: none"> • ask for assistance and communicate needs • begin to participate in school activities, clubs, and teams • continue to use, take pride in, and respect the home language • state basic information about the neighbourhood, municipality, province, and Canada • interact with peers outside own linguistic or cultural group • participate in controlled, directed group work • respect cultural differences and take pride in their own culture • respond with increasing confidence to a variety of teaching strategies

English language learners (**receiving ELD support**) at Stage 1 and Stage 2 may exhibit the following skills as outlined in *English As a Second Language and English Literacy Development: A Resource Guide*, 2001 (pp. 51–54):

Oral Expression and Language Knowledge	
Stage 1	Stage 2
Students begin to use standard Canadian English in appropriate contexts. They:	Students demonstrate increasing use of standard Canadian English in appropriate contexts. They:
<ul style="list-style-type: none"> • respond to oral instructions and information in standard Canadian English in school settings • request clarification or confirmation, when necessary, about assembly routines, library procedures, how to get a public transit pass, and announcements • share personal information and experiences • retell stories • present a prepared story or poem • participate in choral speaking • begin to recognize different varieties of spoken English and their appropriateness for specific contexts and purposes (e.g., social conversation, classroom talk) 	<ul style="list-style-type: none"> • participate in classroom and group discussions • begin to use language to explain, persuade, and negotiate • share personal experiences and opinions • retell stories with details • present book talks and projects • participate in role-playing activities • begin to monitor their own pronunciation and grammar when speaking • recognize different varieties of spoken English and their appropriateness for specific contexts and purposes (e.g., social conversation, classroom talk)

Reading	
Stage 1	Stage 2
Students read and comprehend simple written English. They:	Students read for specific purposes when background knowledge and vocabulary are familiar. They:
<ul style="list-style-type: none"> • recognize the alphabet in both print and script and use alphabetical order • recognize vocabulary common to their environment (e.g., the school, the community) • recognize frequently used words found in most texts • begin to apply some reading strategies (e.g., sight recognition, phonics, using context clues) to derive meaning from text • begin to recognize subject-specific vocabulary • use learners' and visual dictionaries • recognize the main ideas of simple passages • begin to read familiar passages aloud with some fluency • begin to develop the habit of daily reading for enjoyment and information 	<ul style="list-style-type: none"> • understand short phrases and sentences, instructions, and brief notes in a variety of print media with familiar vocabulary and context • begin to use reading strategies to derive meaning from texts (e.g., recognizing cueing systems and word families, predicting, deducing, inferring, rereading, phonics) • expand academic vocabulary (i.e., of subject-related words and expressions) • begin to locate information in textbooks and resources by using tables of contents, headings, margin notes, index, glossary, photographs, and graphic organizers • recognize main ideas and key information in text with familiar background and vocabulary from a variety of genres • begin to read aloud, with fluency and appropriate phrasing and rhythm, passages with familiar vocabulary and background • choose and read books, with assistance or independently, for a variety of purposes, including personal enjoyment

Writing	
Stage 1	Stage 2
Students begin to write using basic structures. They:	Students write for a variety of purposes, with support. They:
<ul style="list-style-type: none"> • print and write the alphabet in upper- and lower-case letters • copy words, phrases, and sentences write short, patterned compositions (e.g., personal information, dialogues) • write short journal entries, narratives, lists, stories, and poems, with assistance • begin to keep notebooks appropriate to the subject area • begin to apply the conventions of standard Canadian English in their writing (e.g., correct punctuation, spelling, capitalization, plural markers, subject-verb agreement, appropriate tenses) • begin to use computers for word processing 	<ul style="list-style-type: none"> • begin to use, in guided situations, a variety of forms, such as short journal entries, notes, dialogues, narratives and reports to answer questions, convey facts and information, express personal views and opinions, and describe scenes, events, and people • organize information around a central idea using graphic organizers (e.g., charts, webs, graphs, diagrams, tables) • begin to make notes (e.g., on texts, videos) • use the writing process, with assistance, to produce an edited copy of written work • apply knowledge of the conventions of standard Canadian English in their writing, with increasing accuracy • use computers for word processing

Orientation	
Stage 1	Stage 2
Students begin to adapt to new environments, both personal and academic. They:	Students demonstrate understanding of and adaptation to new environments, both personal and academic. They:
<ul style="list-style-type: none"> • take pride in and respect their own culture • begin to understand and follow essential school norms, schedules, and emergency procedures and to accept the importance of regular school attendance and punctuality • begin to understand teacher expectations and follow classroom routines (e.g., doing homework, coming to class prepared) • communicate needs to appropriate school personnel and/or peers and ask them for assistance • identify specific times and locations in which to do school work and/or study • begin to relate information about Canadian culture, climate, holidays, and geography to their own activities and interests • work with a partner on a shared academic task • begin to adapt to a variety of teaching approaches and strategies used in a Canadian classroom 	<ul style="list-style-type: none"> • respect other cultures • locate and use school services (e.g., guidance counsellor, library) • participate with increasing comfort and confidence in classroom activities • use some community resources (e.g., the library, a bank) • begin to accept responsibility for own learning by recognizing consequences and managing own time • demonstrate understanding of basic information about the neighbourhood, municipality, province, and Canada • participate in directed group work • respond with increasing confidence to a variety of teaching approaches and strategies • begin to identify personal and educational goals

Note: Grades 9–12 ESL curriculum expectations for Level 1 (ESLAO) and Level 2 (ESLBO) can be found in *The Ontario Curriculum Grades 9 to 12: English As a Second Language and English Literacy Development*, 1999.

A Practical Guide to Supporting English Language Learners

Make Sure They're Ready p. 17

- English language learners must be mathematically and linguistically ready for the math lesson.
- Activate students' prior knowledge to identify their level of English language proficiency, their understanding of math concepts and/or vocabulary, and the areas in which additional teaching is required.

Incorporate Identity p. 18

- Engage English language learners by reflecting their cultures and languages in teaching strategies and examples and in the classroom environment.
- English language learners should work in both their first language and in English as knowledge and skills are transferable from the first language to the academic language.

Make It Language Rich p. 19

- Surround English language learners with the language of mathematics and give them many opportunities to practise using that language to strengthen their learning in both mathematics and language.
- Infuse language teaching and learning into all aspects of the program to support English language learners in developing proficiency in English and improving their math skills.

Make It Comprehensible p. 20

- Comprehension is facilitated when English language learners are able to connect new information to their existing knowledge and experiential background.
- Present the language of mathematics in a meaningful context supported by visual clues and manipulatives.

Make It Explicit p. 22

- Be clear and concise in giving instructions, in making statements, and in providing models for preferred ways of working.
- Teach the strategies that English language learners need to navigate the language of mathematics independently.

Engage the Senses p. 23

- Engage English language learners through visual, tactile, and kinesthetic experiences to provide them with multiple ways of experiencing and learning mathematics while they are developing academic language skills.
- Provide English language learners with multiple ways of accessing language and mathematics beyond reading and writing.

Assess with Sensitivity p. 24

- Use authentic assessment that provides multiple opportunities for English language learners to demonstrate their achievement of the curriculum expectations and learning skills.
- Use varied techniques that are developmentally appropriate and that are set in contexts familiar to the English language learners.

Make Sure They're Ready

Readiness – for all students – is the current knowledge, understanding, and skill level a student has related to a particular sequence of learning. It takes into account what a student knows, understands, and can do based on what the teacher is planning to teach today. For English language learners, readiness refers not only to whether they are cognitively or intellectually ready to understand the mathematics concepts but also to whether or not they have the language skills for learning mathematics in English. The specialized terminology of mathematics, cultural differences in the use of symbols such as decimals and commas, and the processing of mathematical concepts can all be barriers to mathematics success for English language learners, if they are not addressed.

Important aspects of linguistic readiness

Jim Cummins, a leading researcher in the area of second language learning, coined the acronyms BICS (basic interpersonal communicative skills) and CALP (cognitive academic language proficiency) to differentiate between the language that English language learners can use in day-to-day conversations and the language that is needed to learn new, complex concepts. There are very different time periods typically required to develop BICS and CALP; the conversational fluency of BICS is usually acquired to a functional level within two years of initial exposure to the second language, whereas it takes several more years for English language learners to grasp the academic aspects of English. Rosenthal (1996) explains that while BICS allow English language learners to chat casually with teacher and peers, it is CALP that students must utilize to find meaning in the context-reduced language of mathematics. Kapusnick and Hauslein (2001) explain the importance of language readiness for English language learners:

When a student experiences a learning situation, the brain responds with the release of the chemical noradrenaline. Students, who feel intimidated and rejected because their level of readiness is over-challenged, experience an overproduction of noradrenaline, causing the brain to be over-stimulated. Attention is diverted from learning and focused on self-protection, resulting in misbehaviour or withdrawal, with more time being spent on learning to cope rather than learning concepts. (p. 156)

Think About...

English language learners are often expected to do grade-level mathematics before other subjects because of the mistaken belief that math does not depend on language. English language learners may not have the skills in listening, reading, speaking, and writing that are required to be successful in mathematics at that grade level. Consider that even mathematical symbols and conventions can vary across languages, e.g., 4,323 or 4.323; $4\frac{1}{2} = 4.5$ or $4\frac{1}{2} = 4,5$.

It is not uncommon for teachers to have mistaken assumptions about students' cognitive resources. For example, if teachers assume that an English language learner does not know enough mathematics they may give low-level assignments when the student actually does have the necessary mathematics background but only limited language proficiency. Conversely, teachers may assume that English language learners do not understand the language of a problem when their deficiencies are with the mathematics understanding necessary to solve it.

ESL/ELD: A Resource Guide, 2001

Ensure that students are given time to process the new language and are not pressured to speak it until they are ready.

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Incorporate Identity

An image of the society into which students will graduate, and of the kind of contributions they can make to that society, is embedded implicitly in the interactions between educators and students. When teachers incorporate students' languages and cultures within the classroom and see proficiency in languages other than English as a significant accomplishment, they clearly are communicating a very different message regarding identity – one that says individual identities are valued.

Important aspects of incorporating identity

Culture

Kottler and Kottler (2002) advocate for recognition of a student's culture and linguistic background as key to student success. All too often, they note, culturally and linguistically different students are required to acquiesce in the subordination of their identities and to celebrate as 'truth' the perspectives of the dominant group, e.g., a problem that begins with "John's family went on a canoe trip, crossing a lake with a diameter of 7 km and taking two 2 km portages." In studying children with limited English, Kottler and Kottler concluded that to create confident students who value school and value themselves as learners we must draw on, and validate, students' background, their experiences, their cultures, and their languages. When the message, implicit or explicit, communicated to children in the school is "leave your language and culture at the school door" children will also leave a central part of who they are – their identities – at the door.

Language

The research literature consistently notes that literacy skills in the first language and in subsequent languages are strongly related; this pattern has been observed in studies around the world. Brownlie, Feniak, and McCarthy (2000) suggest that when students arrive at school with years of another language they should be encouraged to continue using and developing that language so that they grow cognitively and academically until their English catches up over time.

Children's knowledge and skills transfer across languages from the mother tongue they have learned in the home to the school language. Cummins advocates for use of both the first language and English since both languages will nurture each other when the educational environment permits children access to both languages. Collier (1989) notes that students who learn academic concepts and literacy skills in their first language can more readily and quickly transfer those skills to a second language, because knowledge is grounded in the language and schema they comprehend.

Think About...

A mathematical concept or idea learned in any language will transfer to English, e.g., an English language learner who has learned the Pythagorean theorem in Farsi knows the Pythagorean theorem.

References

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Make It Language Rich

An environment rich in math words provides English language learners with multiple exposures to key vocabulary and language structures for learning mathematics. Students immersed in rich language environments that focus on words and draw students' attention to the learning of words and English language structures more readily learn the language required for success in mathematics.

Important aspects of language-rich learning environments

Mathematics teachers must be aware of the ways in which language is used in mathematics in order to assist English language learners in acquiring the specialized vocabulary and language skills needed for success in mathematics. For example, students need to understand and use language structures, e.g., *greater than*, *less than*, for comparing quantity, speed, and size. They also need to be able to use phrases that indicate specific mathematical operations.

Vocabulary development is critical for English language learners and, to be most effective, should be closely related to the subject matter that students are studying. Echevarria, Vogt, and Short (2004) suggest that embedding new words within the context of the subject taught provides English language learners with the links that they need between content and language. As well, they recommend repeated exposure to new vocabulary so that English language learners see and hear new words more than once and can begin to draw on multiple sources of meaning through repeated use.

Following the reading of a content text, e.g., a math problem, Ruddell (2001) suggests a Vocabulary Self-Collection Strategy (VSS) that will provide students with opportunities to self-select key vocabulary that is difficult for them. Words may be selected by individuals, partners, or small groups, and they should be shared and discussed by the entire class. A list of key vocabulary words is constructed and may be placed in a vocabulary notebook or on a Word Wall. Shearer, Ruddell, and Vogt (2001) found that when students are shown how to identify key content vocabulary they become adept at selecting and learning words they need to know and, given opportunities to practise VSS, their comprehension of the text improves.

English language learners should be given opportunities to 'sort' words. Bear, Invernizzi, Templeton, and Johnston (2000) recommend giving English language learners opportunities to categorize words or phrases which have been introduced; they may sort them by meaning or similarities in structure, e.g., words ending in *-gon* such as polygon, hexagon. The more context that English language learners have for learning words the deeper their learning will be.

Think About...

Display relevant content vocabulary so students can revisit the words frequently throughout the lesson or unit and use those words in their writing and discussions. Multiple Word Walls in one classroom may overwhelm English language learners. It is suggested that one Word Wall be carefully maintained and changed, as needed.

ESL/ELD: A Resource Guide, 2001

Provide notes that highlight key ideas and new words. Use the board or post a chart in the classroom for ongoing reference. Provide a summary sheet so that students can refer to it when studying at home.

References

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Make It Comprehensible

When students don't understand what is being said, or what is expected of them, their anxiety levels increase and they focus on the language itself rather than the subject content. Support must be comprehensible to the learner and be offered in such a way as to allow multiple opportunities to understand and use the language.

Important aspects of making it comprehensible

Dhority and Jensen (1998) explain that language learning involves the whole brain, and the brain looks for meaning. Learning lists of words makes little sense. Using words in a relevant context that has personal meaning for the student enables the English language learner to make connections between what s/he already knows and what is taught. Similarly, Kidd and Marquardson (1998) note that learning is facilitated when students are able to fit new information into their existing knowledge and background. Kern and Warschauer (2000), in reviewing changes in teaching over 30 years, conclude that negotiation of meaning has come to take precedence over structural drill practice, comprehension has taken on new importance, and providing understandable support has become a common pedagogical imperative.

When messages conveyed by teachers in the new language are embedded in an understandable context, they are easily understood. They refer to concrete situations and build on the learner's knowledge of the language. Krashen (2003) stresses the importance of quantity of understandable support, noting that there is a tendency to underestimate how much understandable support is actually needed for an English language learner to progress.

Think About...

English language learners often experience difficulty with making sense of decontextualized language; this can be especially acute in reading math texts. Embedding the language of mathematics in a meaningful context by using manipulatives, pictures, film clips, and other concrete resources can make language understandable. Teachers can also provide context by using metaphors and analogies that bring complex ideas closer to the students' experiences.

ESL/ELD: A Resource Guide, 2001

- Ensure that opportunities for acquiring new vocabulary are always available and are related to curriculum areas.
- Choose simple, straightforward words that are in everyday use. For example, most students will understand *Learn the new words* more easily than *Review the new vocabulary*.
- Reintroduce new words in a different context or use recently learned words to introduce or expand a concept.
- Avoid complex sentences and passive verbs, if possible. For example, instead of *The homework must be completed and handed in by Friday*, it would be better to say *You must finish the work and give it to me on Friday*.
- Pause to get students' attention before making an important point and make sure all students can see you. Use gestures for emphasis; raise pitch and volume slightly; repeat or rephrase, or ask a student to do so. Review instructions and concepts periodically with the class to reinforce students' comprehension.
- Allow sufficient response time when interacting orally with ESL/ELD learners. Students need time to think in the first language and compose a response in the second.
- Check often for comprehension. For example, at frequent intervals say, *Tell me what you have to do next*.
- Provide bilingual support. For students who are in the early stages of learning English, bilingual peers can clarify instruction, provide translations of key words that are difficult to explain in English, and help you to determine whether a student understands.

-
- Speak naturally and slightly more slowly. English language learners have to learn to recognize English as it is actually spoken. It may be necessary to explain contractions such as *don't* and non-standard spoken forms such as *gonna*.
 - Be aware of figurative language. For example, saying *Run that by me again* or *Now we're cookin'!* may confuse second-language learners. Avoid using slang and unusual idioms with beginning ESL/ELD learners. With students who have progressed beyond the beginning stage, develop techniques for explaining the use of non-literal expressions; for example, post a list of the week's idioms.

References

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Make It Explicit

English language learners will most likely find it difficult to interpret indirect or implied statements, so teachers must be clear and concise in giving instructions or making statements. Ambiguous communication confuses English language learners and raises their level of anxiety, which in turn results in a lower level of learning.

Important aspects of making it explicit

Vocabulary and Language Structures

Recent research indicates that a reader requires an understanding of 95% of the words in a piece of text before being able to infer the rest of the meaning. The specialized vocabulary of mathematics presents several obstacles: technical vocabulary, e.g., *integer*; the use of words not normally encountered in conversation, e.g., *quadrilateral*; and learning the correct mathematical meaning of words used differently in everyday speech, e.g., *mass*, *table*, *round*. Combinations of words or complex strings of words are also difficult for English language learners, e.g., *least common denominator*.

Teaching specific language structures found in mathematics, e.g., *greater than/less than*, reduces confusion for English language learners.

Signal words that direct students to a mathematical concept, e.g., addition – *add*, *sum*, *total*, *plus*, *combine*, *join*, and *increased by*, should also be taught explicitly.

Learning Strategies

Walqui (2000) notes that effective teachers develop the student's sense of autonomy through explicit teaching of strategies that enable the learner to approach academic tasks successfully, e.g., steps in solving application problems. The teaching of such metacognitive strategies is a way of scaffolding instruction; the goal is to gradually hand over responsibility to the learners as they acquire skills and knowledge.

Think About...

Be explicit where word meaning, or the operation signalled, can be confusing, e.g., *fewer than* can suggest either adding or subtracting in problems. As an example, "Manuel has seven brothers. He has three fewer than Rafiq. How many brothers does Rafiq have?" To solve this problem, the student is required to add rather than subtract; the word *fewer* in the problem, however, may suggest subtracting.

ESL/ELD: A Resource Guide, 2001

- Ensure that the purpose of various oral communication, reading, and writing tasks is clear to the learner.
- Give clear instructions. Number and label the steps in an activity. Reinforce oral instructions for homework and projects with a written outline to help students who may not be able to process oral instruction quickly enough to understand fully.

References

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Engage the Senses

English language learners should be doers. Visuals and concrete materials that can be touched and manipulated help in making the connections between the words and meanings that are needed in order for mathematical understanding to develop. They help them to demonstrate their understanding in non-verbal ways.

Important aspects of engaging the senses

Comprehension can be facilitated through the use of photographs, illustrations, graphs, diagrams, and other graphic organizers such as Venn diagrams, timelines, and webs (Cummins, 1997). These materials enable English language learners to participate effectively in instruction even when their knowledge of the language is still quite limited.

Barton, Heidama, and Jordan (2002) recommend the use of graphic organizers to help students comprehend mathematics by enabling them to see relationships. Flow charts establish a sequence of events/steps. Venn diagrams help English language learners see similarities and differences. Concept maps can draw out prior knowledge and experience and help to summarize what students have already learned. McLaughlin and Allen (2002) note that graphic organizers will provide English language learners with visual clues that they can use to supplement written or spoken words that may be hard to understand.

English language learners frequently go from being high achievers in mathematics in their own language to struggling with math when it is taught in English. Shoebottom (2001) points out that learners need frequent breaks from sitting at their desks and listening, which can lead to high levels of frustration when their lack of English language proficiency interferes with their ability to do mathematics that they would otherwise find relatively easy if language was not a barrier. The use of tactile and kinesthetic approaches that involve more than listening/reading/writing provides opportunities for English language learners to enhance and display their knowledge effectively.

ESL/ELD: A Resource Guide, 2001

- Use many non-verbal cues. Gestures, facial expressions, and mime will help learners grasp the meaning of what you are saying. Be aware, however, that some gestures, e.g., pointing at people, may have negative meanings in some cultures.
- Make frequent use of a variety of concrete and visual supports. These might include models, toys, math manipulatives, pictures, charts, flashcards, vocabulary lists, key visuals, posters, and banners.
- Demonstrate procedures and provide related hands-on activities.
- Use key visuals. Key visuals are teacher-developed graphic organizers that show how ideas are related. T-charts, Venn diagrams, flow charts, story maps, timelines, and decision trees are examples of organizers that are not dependent on language knowledge and that promote the development of thinking skills such as classifying, relating cause and effect, comparing and contrasting, or following a sequence.

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Assess with Sensitivity

Assessment is used for at least six purposes with English language learners: for screening and identification, for placement, for reclassification or exit, for monitoring student progress, for program evaluation, and for accountability. English language learners require authentic assessment with multiple opportunities, e.g., performance, portfolios, and self-assessment, to demonstrate their achievement of curriculum expectations and learning skills.

Important aspects of assessing with sensitivity

All assessments should provide reasonable opportunities for students to demonstrate their expertise without confronting barriers. The National Council on Education Standards and Testing (1992) found that English language learners should be provided with opportunities to learn and to demonstrate their mastery of material under circumstances that take into account their special language needs.

O'Malley and Pierce (1996) describe four ways in which English language learners are often at a disadvantage when being assessed. When the performance called for in authentic assessment is highly language-dependent, either oral or written, English language learners might be disadvantaged in responding to these types of questions, depending on their level of English proficiency. The responses called for in performance assessments often involve complex thinking skills and many English language learners have not had the opportunity to learn how to express complex thinking in English. Authentic assessments are often used to measure student knowledge in depth in a particular area; English language learners who have had limited opportunities for exposure to the full curriculum might find the knowledge and skills that they do possess missed altogether. Authentic measures usually ask a small number of questions about applications of knowledge to a single theme rather than a large number of questions about a broad range of topics. If the content related to the single theme is culturally unfamiliar, the learner may be unable to respond to any of the questions contained in the assessment.

Hill, Little, and Sims (2004) recommend using varied assessment techniques that are developmentally appropriate and set in contexts familiar to the English language learner. Chamot and O'Malley (1993) describe alternative assessments for English language learners:

- Authentic** – reflecting actual classroom tasks in content areas and revealing information about academic language;
- Varied** – looking at student performance from multiple perspectives rather than relying on only one assessment approach so that all aspects of content and academic knowledge are assessed;
- Process- as well as product-oriented** – showing progress with respect to both work products and the processes and learning strategies used to complete the work;
- Continuous** – providing information about student performance that shows growth throughout the entire school year;
- Interactive with instruction** – used to adjust instruction for student needs and provide feedback on instructionally valued tasks;
- Collaborative** – planned and conducted by teachers interactively in order to share and gain independent views of student performance.

Think About...

Assess the English language learners taking into account their facility with the English language.

ESL/ELD: A Resource Guide, 2001

Asking an English language learner to present to a group of peers or to the whole class may be viewed by this learner as a peer assessment. Teachers need to be sensitive to challenges faced by English language learners when presenting to peers, and suggest alternative forms of presentations to increase comfort levels.

References

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