

INTEGRATION OF SCIENCE AND LANGUAGE WITH A FOCUS ON MULTILINGUAL LEARNERS: SHARED OPPORTUNITIES AND RESPONSIBILITIES

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This article highlights the importance of promoting science and language learning for all students, especially multilingual learners. In recent years, there have been parallel instructional shifts in science and language with multilingual learners, which enables integration of science and language in mutually supportive ways. These instructional shifts have resulted in new opportunities for collaboration between language educators and science educators as well as development of new instructional resources. Such collaboration and resources are essential for creating equity for multilingual learners. In this article, I describe contemporary perspectives on integrating science and language with multilingual learners across policy, research, and practice. I also provide a classroom example using a unit from the Science And Integrated Language (SAIL) curriculum and a series of webinars and briefs based on the SAIL curriculum for the New York State Education Department.

It was an honor to be invited to give a talk at the 50th anniversary of the New York State TESOL conference in 2020. I feel privileged to be included among the group of distinguished speakers invited to address the organization. I am honored again to be invited to write this article for our membership. The purpose of the article is to highlight the importance of promoting science and language learning for multilingual learners. New opportunities for collaboration between language educators and science educators are being forged as well as new instructional resources are being developed. Such collaboration and resources are essential for creating equity for multilingual learners.

At the time of this writing in mid-2021, the federal government has identified seven immediate priorities (<https://www.whitehouse.gov/priorities/>). Three of these priorities—COVID-19, climate, and health care—are rooted in science, and two focus on racial equity and immigration. These five priorities collectively influence the remaining two priorities—economic recovery and restoring America’s global standing. The national policies to address these seven immediate priorities will require dramatic changes in society, including changes to our education system, and will place science and equity, including racial and linguistic equity, at the core. Moreover, Secretary of Education Dr. Miguel Cardona has put multilingual learners at the top of his agenda. As a multilingual learner himself, Dr. Cardona is personally and professionally aware of how the strength of the nation rests on the effectiveness of our education system. He has called for greater equity across the nation’s schools through the leveraging of students’ identities: “Your uniqueness will be viewed as a deficit. Some will try to make you believe that what sets you apart, sets you back. I am here to remind you that your so called ‘deficits’ are in fact your superpowers” (Cardona, 2021, para. 5).

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The federal government's focus on science and equity is timely for the New York State P-12 Science Learning Standards that were adopted in December 2016. After the "raise awareness and build capacity" phase from September 2017 to August 2019, these standards began undergoing the "transition and implementation" phase, which will continue through August 2023 (<http://www.nysed.gov/common/nysed/files/programs/curriculum-instruction/science-timeline.pdf>). The new science standards are expected of all students; hence, "all standards, all students." Since multilingual learners are expected to achieve the same science standards as other students, we must find ways to effectively teach science to students who are simultaneously developing their English proficiency. Today, we have a much more advanced understanding of how to promote science and language learning with multilingual learners, and new resources are available for accomplishing this in the classroom. As such, educators need to understand contemporary approaches to science learning, language learning, and the mutually supportive nature of content and language learning.

The New York State P-12 Science Learning Standards are grounded in contemporary research presented in *A Framework for K–12 Science Education* (National Research Council, 2012) and the Next Generation Science Standards (NGSS Lead States, 2013b). The *Framework* and the NGSS highlight equity (NGSS Lead States, 2013a; see also Lee et al., 2015). For example, since *all* students are expected to make sense of phenomena and design solutions to problems, contemporary instructional approaches capitalize on students' cultural and linguistic resources and view these as an asset rather than a deficit. In addition, the phenomena and problems presented in the science classroom are often situated in students' homes and local communities.

This article describes contemporary perspectives on integrating science and language with multilingual learners. It presents contemporary instructional approaches to science learning and language learning and demonstrates how these approaches are mutually supportive. Then, it provides a classroom example using a unit from the Science And Integrated Language (SAIL) curriculum and a series of webinars and briefs based on the SAIL curriculum for the New York State Education Department.

Contemporary Perspectives on the Integration of Science and Language

Alignment between content instruction and English language proficiency instruction is required by the Every Student Succeeds Act of 2015 (commonly referred to as ESSA): "Each State plan shall demonstrate that the State has adopted English language proficiency standards that . . . are aligned with the challenging State academic standards" (U.S. Department of Education, 2015, p. 24). This federal legislation does not say that English language proficiency standards are expected to be met prior to academic standards. Instead, multilingual learners engage in science regardless of their English language proficiency and learn science and language in parallel.

To promote science and language learning with multilingual learners, we need to understand contemporary instructional approaches to science learning and language learning. In recent years, there have been parallel shifts in science and language instruction with multilingual learners. As a result, science instruction and language instruction can be implemented in ways that make them mutually supportive of each other.

In science education, traditional instructional approaches focused on individual learners' mastery of discrete elements of content. Scientists and science educators defined canonical knowledge of science disciplines, which was typically presented in science textbooks. As students were told to read and write about science knowledge, literacy (reading and writing) played a key role. Some students learned science, but science did not make sense to many students. In contrast, the new science standards place equity at the center (Lee et al., 2015), and contemporary approaches have replaced traditional approaches. In contemporary approaches, all students are making sense of phenomena or designing solutions to problems by "doing" science and engineering as scientists and engineers do in their professional work. Students are engaged in "junior" versions of science and engineering. Thus, whereas traditional

approaches focused on “what science is” or “a body of knowledge,” contemporary approaches focus on “what science does” or “knowledge-in-use.”

In language education, traditional instructional approaches focused on discrete elements of vocabulary and grammar to be internalized by individual learners. Students learned vocabulary and grammar as a prerequisite or precursor to learning science, and they were often pulled out of science classrooms to receive language instruction. In contrast, the new science standards offer opportunities for rich language use (Lee et al., 2013, 2019). In contemporary approaches, as students are “doing” science, they use language. All students, regardless of English language proficiency, engage in science. They communicate their science ideas using multiple meaning-making resources, including gestures, visuals, computer models, and home languages. In addition, they communicate their science ideas using everyday language. Over the course of instruction, as students develop more sophisticated understanding of science, they use multimodality more strategically and use more specialized language. Thus, whereas traditional approaches focused on “what language is” or “structural elements of language,” contemporary approaches focus on “what language does” or “language-in-use.”

The National Academies of Sciences, Engineering, and Medicine (NAEM) recently convened a panel of experts across language and STEM subjects. The *English Learners in STEM Subjects* consensus report (NAEM, 2018) presents contemporary perspectives on STEM and language learning with multilingual learners. The report describes contemporary instructional approaches from the perspective of STEM subjects with multilingual learners:

- Identify compelling phenomena or problems
- Engage students in disciplinary practices in STEM subjects
- Engage students in productive discourse and interactions with peers and the teacher
- Encourage students to use multiple registers toward specialized registers and multiple modalities, including both linguistic and visual modalities
- Leverage multiple meaning-making resources, including physical objects, gestures, everyday language, home language, and translanguaging
- Provide some explicit focus on how language functions in the discipline (i.e., metalanguage or language about language)

These contemporary instructional approaches highlight two key features. First, the instructional approaches begin with STEM subjects and then use language needed to learn STEM subjects. Second, the emphasis on using language to learn STEM subjects in contemporary approaches differs from the emphasis on vocabulary and grammar as a precursor or prerequisite to learn STEM subjects in traditional approaches.

Classroom Example

A classroom example is provided to illustrate contemporary instructional approaches to integrating science and language with a focus on multilingual learners. The SAIL team at New York University developed a yearlong fifth-grade curriculum aligned to the NGSS, with funding from the National Science Foundation. The curriculum consists of four units in physical science, life science, Earth science with engineering embedded, and space science. Each unit lasts approximately a nine-week marking period.

To describe science and language instructional shifts, the first of the four curriculum units (i.e., the Garbage Unit) is described. Through rigorous external reviews by expert panels, the SAIL Garbage Unit was awarded the NGSS Design Badge, which is the highest rating for NGSS-aligned curriculum units. To date, this unit is one of only three elementary school units that have been awarded the NGSS Design Badge. It is also the only unit focused specifically on multilingual learners. The Garbage Unit and its supplementary materials are open-source resources available to the public at <https://www.nextgenscience.org/resources/examples-quality-ngss-design>. The other three units follow the same design principles as

the Garbage Unit (see NASEM, 2018, Box 3-1 on pp. 64–65; visit the New York University SAIL Research Lab at <https://www.nyusail.org/>).

Science Instructional Shifts in SAIL Curriculum

The new science standards involve key instructional shifts: (a) making sense of phenomena (in science) and designing solutions to problems (in engineering); (b) engaging in three-dimensional learning by blending science and engineering practices (SEPs), crosscutting concepts (CCCs), and disciplinary core ideas (DCIs); and (c) building science learning progressions through coherent understanding across time.

Science Instructional Shifts

The first science instructional shift involves making sense of phenomena and designing solutions to problems as scientists and engineers do in their professional work. This shift is perhaps the most important change for instructional practices, and it is fundamentally different from previous science standards. Phenomena and problems should be compelling and motivating for all students to figure out, especially those students who do not see science as relevant to their everyday lives or future careers (Lee, 2020). With all learners, local phenomena and problems involve everyday experience and language in their homes and communities. Local phenomena promote both equity and science. From an equity perspective, through place-based learning, students apply science and engineering to their daily lives in local contexts of home and community. Multilingual learners bring with them a vast array of cultural and community resources that help them make sense of phenomena and design solutions to problems. From a science perspective, through project-based learning, students integrate science disciplines as they investigate a driving question to explain a phenomenon and use engineering to design solutions to a problem.

The second shift involves three-dimensional learning by blending SEPs, CCCs, and DCIs (NRC, 2012). SEPs describe “(a) the major practices that scientists employ as they investigate and build models and theories about the world and (b) a key set of engineering practices that engineers use as they design and build systems” (NRC, 2012, p. 30). CCCs have “applicability across science disciplines” (NRC, 2012, p. 29), offer “explanatory value throughout much of science and engineering, . . . [and] provide students with an organizational framework for connecting knowledge from the various disciplines into a coherent and scientifically based view of the world” (NRC, 2012, p. 83). DCIs are organized into four disciplines: physical sciences; life sciences; Earth and space sciences; and engineering, technology, and applications of science. These core ideas are not science content in a traditional sense; instead, these core ideas offer explanations to make sense of phenomena and design solutions to problems. As DCIs provide explanatory power, they depart from the traditional notion of science content consisting primarily of science concepts to be tested.

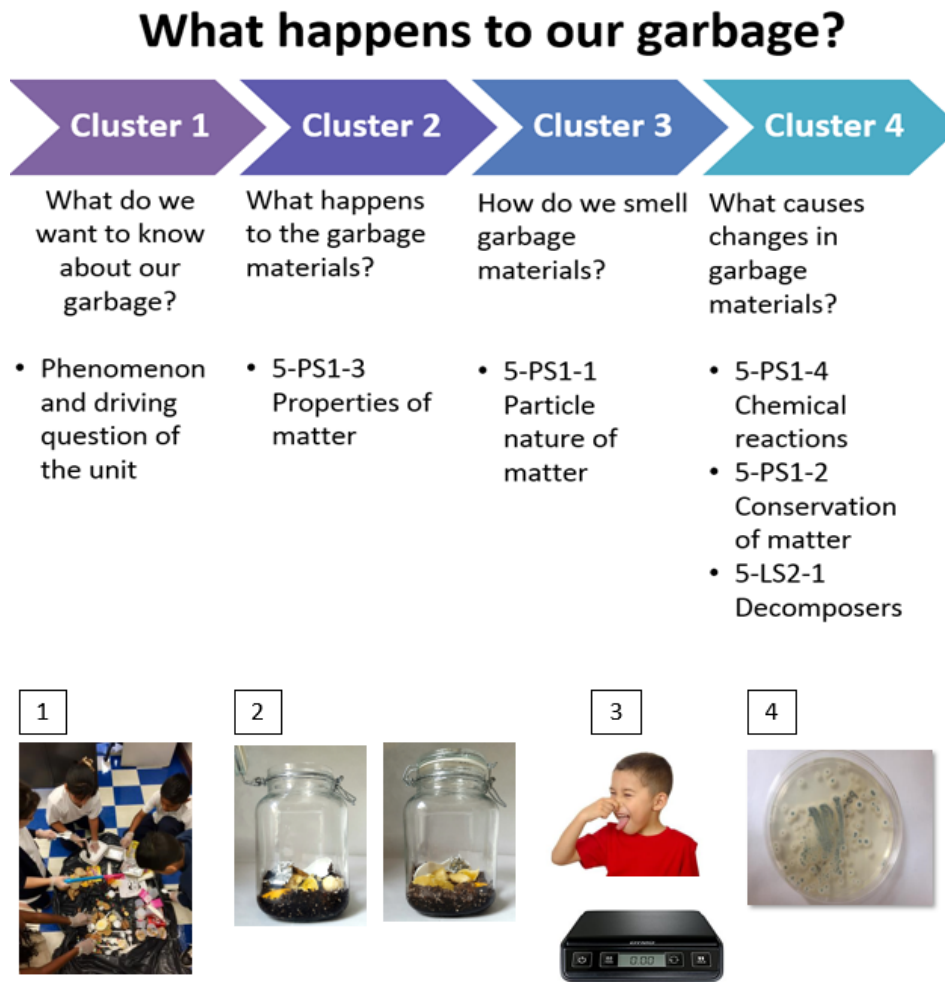
The third shift involves coherent learning progressions of student understanding over time, which occur across Grades K–12 as well as across shorter time frames, such as within a grade band, grade level, or science unit. A science unit starts with a phenomenon, which leads to a question. To answer the question, students engage in SEPs and figure out the answer using DCIs and CCCs. Answering one question sparks the development of the next question, and this process continues using a storyline. Over the course of the science unit, students coherently develop their understanding. At the end of the unit, students answer the driving question and make sense of the phenomenon.

SAIL Curriculum

The SAIL Garbage Unit addresses structure and properties of matter in physical science and introduces ecosystems leading to the next unit in life science. The phenomenon is that our school, home, and community make large amounts of garbage every day, which go to a landfill. The driving question is framed broadly, “What happens to our garbage?” Over the course of a nine-week marking period, students answer the driving question and make sense of the phenomenon.

Figure 1¹

Sequence of Instruction (or Storyline) of the SAIL Garbage Unit



The storyline of the Garbage Unit is summarized as follows (see Figure 1). Using lunch garbage at school, students sort garbage materials into categories and look for patterns of garbage materials in different categories. They also sort garbage materials at home and look for patterns in different categories. In addition, they identify that the garbage system has subsystems of school garbage, home garbage, and neighborhood garbage, which all go to a local landfill. The students observe that the school, home, and neighborhood make large amounts of garbage every day. Then, they ask the driving question, “What happens to our garbage?” (see Cluster 1 in Figure 1).

Students make open and closed “landfill bottles” with banana and orange as food materials and aluminum foil and a plastic spoon as nonfood materials. Over time, students observe changes in the properties of garbage materials in the open and closed landfill bottles. They also measure the weights of the open and closed bottles (see Cluster 2 in Figure 1).

¹All figures in this essay were reprinted with permission from the Science And Integrated Language (SAIL) Research Lab at New York University.

After a few weeks, students measure the weight of the closed bottle. Although the food materials have vanished, the weight stays the same. Then, the students open the closed bottle and smell the garbage. Students explain that the smell is a gas made of particles that are too small to see but move freely to reach the nose (see Cluster 3 in Figure 1).

Students find out that microbes are causing food materials to decompose, and this life science core idea is partly addressed in the Garbage Unit and then fully addressed in the next unit on ecosystems. They explain that smell is a new substance when microbes decompose food materials. They also explain that in the closed landfill bottle, the weight of the garbage materials is conserved, even though the food materials seem to have vanished (see Cluster 4 in Figure 1).

Language Instructional Shifts in SAIL Curriculum

Language instructional shifts, informed by contemporary perspectives in second language learning, highlight language use for a particular purpose in a particular context. While students are “doing” science, they use language. The emphasis on using language to learn science in contemporary perspectives differs from the emphasis on vocabulary (lexicon) and grammar (syntax) as a precursor or prerequisite to learn science in traditional perspectives. Language instructional shifts include (a) using multiple modalities strategically, (b) using multiple registers by progressing from everyday to specialized registers, and (c) using language across different types of interactions (Lee et al., 2013, 2019; NASEM, 2018).

Language Instructional Shifts

First, students learn to use multiple *modalities* strategically. Modalities refer to the multiple and varied channels through which communication occurs. Multiple modalities include visual modalities (e.g., gestures, pictures, symbols, graphs, tables, and equations) and the linguistic modalities of talk (oral language) and text (written language; Lee et al., 2019). In science and engineering, multiple modalities, especially the visual variety, are essential meaning-making resources. In language education, multiple modalities support multilingual learners at the early stages of English language proficiency to engage in science and engineering practices that are language intensive, such as developing models, arguing from evidence, and constructing explanations. Thus, multiple modalities are essential to engagement in science and engineering practices and particularly beneficial to multilingual learners (Grapin, 2018).

Second, students learn to use increasingly specialized *registers* of talk and text. Registers refer to the language used in talk and text that is associated with particular contexts of use (Biber & Conrad, 2009). Registers can range from everyday to specialized. As students build science understanding over the course of instruction, their language use becomes increasingly specialized. This specialized register affords the *precision* necessary to communicate disciplinary meaning as students’ science ideas become more sophisticated (Grapin et al., 2019; Quinn et al., 2012). In the science classroom, precision goes beyond the use of vocabulary to the communication of precise disciplinary meaning. In addition, precision does not imply linguistic accuracy. Multilingual learners can communicate precise disciplinary meaning using their emerging English.

Finally, students learn to use language to meet communicative demands of different types of *interactions*. Which modalities and registers are used is determined, in part, by whether interactions are one-to-one (e.g., one student communicating with a partner), one-to-small group (e.g., one student communicating with a small group), one-to-many (e.g., one student communicating with the whole class), or small group-to-many (e.g., small groups making class presentations). In doing so, students move fluidly across modalities and registers to meet the communicative demands of different types of interactions. While one-to-one interactions allow students to check for comprehension in real time (“now”) and space (“here”) and clarify their meaning as needed, one-to-small group or one-to-many interactions do not always offer such opportunities. The specialized register affords the *explicitness* (e.g., fewer deictic words

like “it” and “there”) necessary to communicate disciplinary meaning across temporal (beyond “now”) and physical (beyond “here”) contexts.

SAIL Curriculum

SAIL capitalizes on language learning opportunities and demands with all students, especially multilingual learners. Over the course of instruction, students develop deeper and more sophisticated understanding of science to make sense of phenomena. As science understanding becomes more sophisticated, language use becomes more specialized. To communicate the sophistication of their science ideas, all students, including multilingual learners, use multiple modalities more strategically and more specialized registers across different types of interactions. To highlight the three language instructional shifts of modality, register, and interaction, we use the phenomenon of the smell of garbage (see Cluster 3 in Figure 1).

First, students use multiple modalities to engage in SEPs throughout the Garbage Unit. With regard to the smell of garbage (see Cluster 3 in Figure 1), students learn to use multiple modalities more strategically to communicate the sophistication of their science ideas about smell. As students develop models of smell, they use both visual (e.g., drawings, diagrams, and symbols) and linguistic (i.e., talk and text) modalities to communicate their ideas about smell.

At the beginning of Cluster 3, students developed initial models of the smell of pizza in the school cafeteria. Figure 2 shows a student’s initial model of the smell of pizza, which included labels of objects and descriptions of events (linguistic modality) and visuals (nonlinguistic modality). The student wrote “The lines are the smell” and drew the smell of pizza as wavy lines. The student did not show understanding of the particle nature of gas.

Figure 2

Initial Model of Smell at the Beginning of Instruction

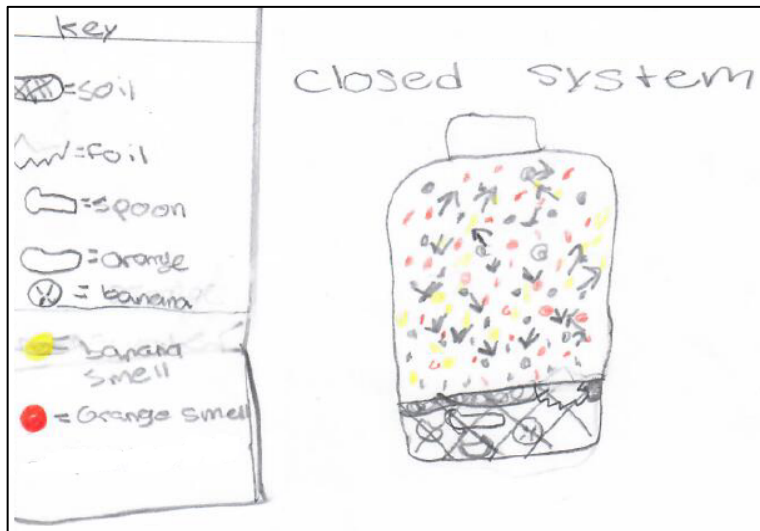


Over the course of instruction, as students build their understanding of the particle nature of gas, they use visual (drawings and symbols) and textual (written language) modalities more strategically to represent the increasing sophistication of their science ideas. While all students use multiple modalities to engage in developing models, multilingual learners in particular benefit from opportunities to represent their science ideas by using their full range of meaning-making resources.

By the end of Cluster 3, the same student who developed the initial model in Figure 2 developed a revised model of the smell of garbage that indicated the particle nature of gas and random movement of particles (see Figure 3). The student showed understanding of the particle nature of gas by drawing the particles of banana smell in yellow dots and the particles of orange smell in orange dots, as the two different colors represented two different substances. In addition, the student showed understanding of the random movement of particles by drawing arrows moving in random directions.

Figure 3

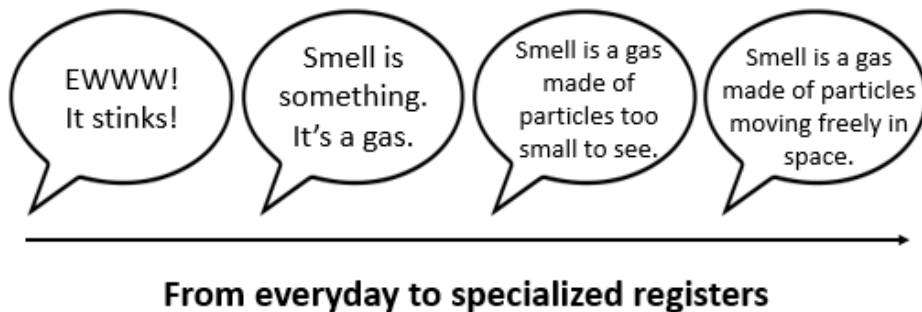
Revised Model of Smell at the End of Instruction



Second, students draw on both everyday and specialized registers throughout the Garbage Unit. With regard to the smell of garbage in Cluster 3 (see Figure 1), the teacher amplifies language use by providing opportunities for all students to use all of their linguistic resources (see Figure 4). When students first notice the smell coming from the open landfill bottles, they communicate their ideas using a more everyday register (e.g., "It stinks!"). The teacher guides students: "If smell stinks, is it something or nothing?" Building on what students should have learned about solid and liquid in second grade, the teacher asks, "Is smell a solid?" and "Is smell a liquid?" Students learn that smell is a gas. The teacher continues, "If smell is a gas, why can't we see it?" As students engage in a series of investigations (e.g., compressing air in a syringe and feeling pressure pushing back on the plunger) and build their understanding of the particle nature of gas, they need a more specialized register to communicate precisely about what is happening inside the syringe—i.e., "smell is a gas made of particles too small to see" and "moving freely in space." The phrase "too small to see" is precise about the scale at which gas particles can be observed. Similarly, the phrase "moving freely in space" is precise about the movement of gas particles.

Figure 4

Amplifying Language Use from Everyday to Specialized Registers

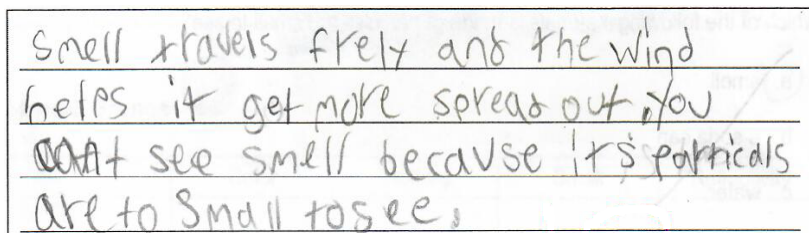


Over the course of Cluster 3 (see Figure 1), as students build their understanding of the particle nature of gas, they use a more specialized register to communicate the increasing sophistication of their ideas. The specialized register goes beyond grammar and vocabulary (e.g., “particles”) to the precise communication of ideas. A focus on precision is especially consequential for multilingual learners, whose contributions should be valued for their disciplinary meaning rather than their linguistic accuracy (Grapin et al., 2019; Lee et al., 2019). Multilingual learners communicate precise disciplinary meaning through their emerging English.

At the end of Cluster 3 (see Figure 1), a student explained the smell of garbage as shown in Figure 5. The phrase “travels freely” communicates precise disciplinary meaning about the movement of gas particles. Similarly, the phrase “too small to see” communicates precise disciplinary meaning about the scale at which gas particles can be observed. Moreover, precision is distinguished from linguistic accuracy, as this student communicates precise disciplinary meaning through her emerging English (e.g., “particles are too small to see”).

Figure 5

Student Explanation of How Smell Travels



Finally, students adapt their language to meet varying communicative demands of different types of interactions. As science often involves communicating about objects and events not immediately present, students’ language use becomes more explicit. Explicitness makes language use more effective with “distant” audiences beyond “here and now.” In the Garbage Unit, when planning the landfill bottle investigation in small groups (one-to-small group interaction), students use a more everyday register, as they can check for comprehension and clarify meaning in real time and space. When students share their arguments and explanations with the class (one-to-many interaction), they use a more specialized register, as this register affords the explicitness necessary to communicate beyond the “here and now.”

With regard to the smell of garbage in Cluster 3 (see Figure 1), students use a range of modalities and registers across different types of interactions and become more skilled in adapting their language to meet

the communicative demands of different interactions. For example, working in partners (one-to-one), students engage with a computer simulation that models what is happening inside the syringe. Pointing to the particles on the screen, students use a more everyday register in conjunction with the visual modality (e.g., "Look at them move!"). A more everyday register is effective in this interaction because there is joint attention to a common focus (i.e., the computer screen), and students can request clarification in real time (e.g., "What moved?"). When the class comes together to share their observations (one-to-many), students have to use a more specialized register to make their meaning *explicit* in the absence of a shared frame of reference (e.g., "The particles were moving all around and bouncing off each other in different directions."). A more specialized register is effective in this interaction because of the explicitness this register affords for communicating beyond the here and now. When teachers support multilingual learners to meet the communicative demands of different types of interactions, they promote meaningful participation of multilingual learners in the science classroom.

Series of SAIL Webinars and Briefs

In collaboration with the New York State Education Department Office of Bilingual Education and World Languages and Office of Curriculum and Instruction, a research team at New York University produced a series of webinars and briefs (<http://www.nysed.gov/bilingual-ed/news/integrating-science-and-language-all-students-focus-english-language-learners>; <http://www.nysed.gov/bilingual-ed/integrating-science-and-language-all-students-focus-english-language-learners>).

The purpose of these webinars and accompanying briefs is to describe how to integrate science and language in instruction and classroom assessment for all students with a focus on multilingual learners (see Figure 6). This series takes the perspective of academic disciplines, rather than the perspective of language, to integrating content and language with multilingual learners. Specifically, we focus on the ways that science as a discipline provides opportunities for multilingual learners to participate meaningfully in their classroom communities. This series is timely, as new science standards are currently being implemented in New York and across the nation with a fast-growing population of multilingual learners.

The series consists of seven sets of webinars and briefs, with each webinar being accompanied by a brief. Together, the webinars and briefs illustrate contemporary approaches to science and language instruction and classroom assessment with multilingual learners.

The introduction and the first two webinars and briefs serve as an *overview*. The introduction describes contemporary perspectives on science and language integration. Webinar and Brief 1 unpack the New York State P-12 Science Learning Standards, and Webinar and Brief 2 provide an overview of science and language instruction with multilingual learners using the SAIL Garbage Unit.

The next three webinars and briefs focus on science and language *instruction* with multilingual learners. Webinar and Brief 3 describe the science instructional shifts with multilingual learners, and Webinar and Brief 4 describe the language instructional shifts with multilingual learners. Webinar and Brief 5 illustrate the science and language instructional shifts using a classroom example with multilingual learners.

The last two webinars and briefs focus on *assessment* with multilingual learners. Webinar and Brief 6 describe the science and language assessment shifts with multilingual learners, while Webinar and Brief 7 address formative assessment with multilingual learners in the science classroom.

Figure 6

Integrating Science and Language for All Students, with a Focus on English Language Learners



Conclusion

Science and language instructional shifts indicate their mutually supportive nature with all students, and multilingual learners in particular. Contemporary approaches view multilingual learners as capable of using language purposefully while learning science, which is different from traditional approaches that viewed multilingual learners as needing to develop English proficiency as a precursor or prerequisite to participating in the science classroom. As students make sense of a phenomenon (e.g., What happens to our garbage?), they engage in three-dimensional learning by blending SEPs, CCCs, and DCIs. Over time, they develop increasingly sophisticated understanding of science (i.e., learning progressions). While “doing” science, students use language. They initially draw on a range of modalities (e.g., drawings, symbols, written language) to communicate their ideas. As they build their science understanding over time, they become more strategic in using multiple modalities to represent the sophistication of their ideas. Also, students initially use a more everyday register to communicate their ideas. As they build their science understanding over time, they progress toward using a more specialized register to communicate the sophistication of their ideas with precision. In addition, students participate in different types of interactions typical of the science classroom. As these interactions demand different degrees of explicitness, students move fluidly across modalities and registers to meet varying communicative demands.

Contemporary perspectives on “knowledge-in-use” in science learning highlight “what science knowledge does” (i.e., use science ideas to make sense of phenomena and problems), rather than “what science knowledge is” (i.e., master canonical knowledge of science disciplines). In a similar manner, contemporary perspectives on “language-in-use” in second language learning highlight “what language does” (i.e., use language for a particular purpose in a particular setting), rather than “what language is” (i.e., master grammar and vocabulary). Contemporary perspectives on using language to learn science and learning language as a product differ from traditional perspectives on language in which vocabulary (lexicon) and grammar (syntax) were a precursor or prerequisite to learn science. As students *use language to do science*, they develop their science understanding and language proficiency in tandem over time.

The implementation of the New York State P-12 Science Learning Standards supports the national policies focusing on science and equity. Furthermore, Secretary of Education Dr. Miguel Cardona includes multilingual learners at the top of his agenda. Collaboration between the New York State TESOL community and the science education community in the state could ensure that “all standards, all students” becomes a reality for the growing population of multilingual learners across New York State.

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