

The Question Formulation Technique: Validating Students' Voices

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Our dual language PreK-8 classrooms at Dual Immersion Academy in Grand Junction, Colorado are buzzing with students' voices. Questions are *volando*. The energy and enthusiasm in the room are palpable. What is happening? Students are generating their own questions about beavers in first grade, *esfuerzo y moción* in second grade, author's craft in third grade, multiplying large numbers in fourth grade, European colonization in fifth grade, *las complejidades de las ecuaciones lineales* in sixth grade, *la tabla periódica de elementos* in seventh grade, and the Constitution of the United States in eighth grade.

The questions our students are creating are just part of a larger protocol or methodology that we have been practicing in our dual language program for the past three years: The Question Formulation Technique (QFT). From the brilliant work of our colleagues at the Right Question Institute (<https://rightquestion.org/>), we have learned how to engage our students by empowering them to ask their

own questions across content areas in both of their languages and to leverage their own questions for inquiry-based learning. Not only are our students more engaged with the content, they are learning a critical skill that will serve them, our society, and our democracy: the ability to ask great questions.

The Question Formulation Technique includes six core components:

- A **question focus**, usually developed by the teacher that serves as the jumping-off point for student questions;
- A process for students to produce their own questions while following **four simple rules**;
- An exercise for students to **analyze, classify, and revise** their questions into closed- and open-ended questions;
- Student selection of **priority questions**;

Numeros Racionales

Valor Absoluto

- la distancia entre un número dado
- utilizamos el símbolo $| |$

$| -6 | = 6$

$| 23 | = 23$

$| -4.5 | = 4.5$

Estándares

Estudiantes podrán:

1. Marcar puntos en una línea numérica **con precisión** y hallar la distancia entre ellos.
2. Hallar el valor absoluto.
3. **Persistir en** marcar puntos en los cuatro cuadrantes de una gráfica coordenada.
4. **Buscar patrones** en hallar la distancia entre puntos en una gráfica coordenada.

¿Qué ya sabemos?

- decimales y fracciones como usar una gráfica
- la gráfica coordenada contiene números positivos y negativos
- marcar puntos en una línea numérica (incluye fracciones y decimales)
- números negativos son menos de cero
- hay múltiples maneras de usar gráficas
- paréntesis significan algo específico

La Investigación de Numeros Racionales

Que Queremos Saber:

1. ¿Qué significa valor absoluto? $| |$
2. ¿Cómo se usa valor absoluto en la vida real?
3. ¿Por qué se llega a números negativos?
4. ¿Dónde se encuentran números negativos en la vida real?
5. ¿Cómo se usa la gráfica coordenada?
6. En la gráfica coordenada, ¿qué significan las letras: los números en paréntesis, los números pequeños?

Students work together in heterogeneous groups to formulate questions for their upcoming mathematics unit. Those questions are added to the Compendium, a large class resource chart.

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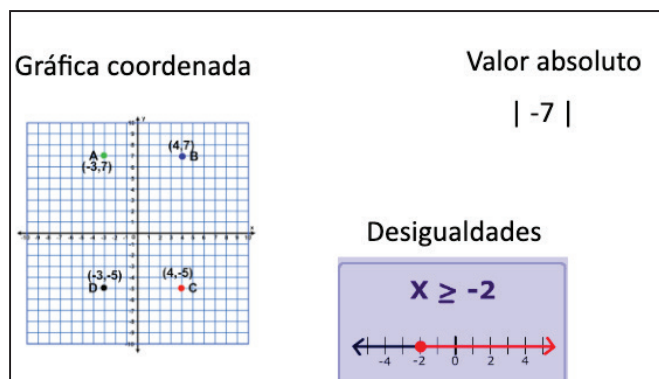
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- A teacher and student plan for **next steps**—how they will use the priority questions; and
- A **reflection activity** for students to name what they have learned, how they learned it, and how they will use what they learned.

Let's take a walk through the entire process with a sixth-grade math class in Spanish as our example. Working alongside my colleague Johnna Keith, sixth grade teacher (math and science in Spanish) at Dual Immersion Academy Bookcliff Middle School, we designed the QFT for her unit on *números racionales*/rational numbers. We wanted to note our students' prior knowledge of the topic and support them in asking questions that would guide our instruction and motivate them to seek answers. We also knew that the questions students asked regarding a unit or topic of study could serve as a formative assessment of their prior knowledge. Both a listing of what they knew and the questions they generated as part of the QFT process were added to our Compendium, a large class resource chart that is part of the AIM4S^{3™} Framework. (See picture on page 2.)

Enfoque Q/Q Focus

Johnna and I followed these four elements in the design of the Question Focus or Q Focus: it has a clear focus, it is NOT a question, it provokes and stimulates new lines of thinking, and it does not show teacher preference or bias. The Q Focus we designed included three visual images; we selected images of a coordinate graph, absolute value, and inequalities because they represented essential concepts that we would be studying about rational numbers. Initially, we thought we would just use the images, but then we wondered, "Would students be able to generate clear enough questions without attaching the academic vocabulary to the image?"



We labeled each image with concise vocabulary and found that it was a good move. The questions the students generated were much more accurate.

Las reglas/The Rules

Next, we reviewed the rules for generating questions with our students: 1) Ask as many questions as you can, 2) change any statement into a question, 3) do not discuss the answers to the question, and 4) number each one. "¡Tienen cinco minutos!/You have five minutes!

Students worked together in heterogeneous groups of four to pose their questions. One student was designated as the scribe; another was designated to share out with the group. We also ensured students had a tree map of Bloom's question stems to help get them started with posing questions. We knew that oftentimes, our second language learners might have a question in mind, but lack the precise language construction to make the question as hard hitting as it could be.



Bloom's question stems are available to help students formulate their questions.

Johnna and I circled the room, listening in on conversations, posing clarifying questions, and calling out the time remaining. This is where the magic happened! We heard students posing questions to their group (speaking), the group understanding the question (listening), debating if the question was worthwhile (speaking and listening), and then writing the question or idea down in the format of a question (writing). Also, students continuously reviewed the questions they

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had written down (reading). At minute four, we reminded our students to number their questions.

Preguntas cerradas y abiertas/Closed- and Open-Ended Questions

The next step in the process was to ask students about closed and open questions. “What is a closed-ended question?” And here is where my elementary background brain was blown: they knew the difference! Kendra said, “A closed-ended question is answered with a one-word response or a yes or no.” Exactly. “What is an open-ended question, then?” Marco, another student answered, “Open-ended questions require a lot of words to answer.” Exactly. We instructed them to label each of their questions as open or closed with a letter: O or C. Since this lesson was in Spanish, *A significa abierta y C significa cerrada*. We heard students re-reading their questions and debating if the question was open or closed (reading, listening, speaking).

What is the purpose of asking students to analyze their own questions and decide if they have created open or closed questions? The authors of *Make Just One Change: Teach Students to Ask Their Own Questions* (Rothstein & Santana, 2017) argue the following:

To look at the differences between closed-ended and open-ended questions and to learn how to change one kind into another becomes a shortcut to better answers. And [students] will engage in a powerful metacognitive thinking exercise about the purposes and uses of different types of questions and ways to obtain information. (pg. 74)

In our classrooms, we have also noticed a certain level of empowerment when students realize that every question they create or encounter can be made into an open-ended question or a closed-ended question. Some of our best conversations and debates have arisen by arguing for and against a question being open or closed ... or both.

Next, we posed the questions: “What are the advantages of an open-ended question? What are the disadvantages of an open-ended question?”

Students raced to answer: “Open-ended questions allow for a lot of different answers. Questions with a lot of different answers can be hard.” Yes! Next, we asked, “What are the advantages of a closed-ended question?” Ale answered, “There is one right answer and that’s it.” “What are the disadvantages of a closed-ended question?” Camela answered, “There is not really any discussion ... it is a quick answer.” Exactly. Are both types of questions valuable? Absolutely! We knew that both questions lend themselves to thinking about the topic at hand.

Abierta a cerrada y cerrada a abierta/Open to Closed, Closed to Open

Now we asked our students to revise and edit their questions by directing them to: “Choose one open question and change it to a closed question and change one closed question and change it to an open question.” They wrestled with the syntax of the question and discovered swift moves to change their questions. One group took on the question they posed about *valor absoluto*/absolute value. “¿Qué significa *valor absoluto*?/What is absolute value?” The group discussed the question and then Yishai offered, “*Para cambiarla a una pregunta abierta, podemos preguntar: ¿Cómo se usa valor absoluto en la vida real?*/In order to change the question to an open question, we could ask: How do we use absolute value in real life?” Closed to open. Yes.

Another student identified a quick move to change an open-ended question to a closed-ended question. “*Porqué no la cambiamos de: ¿Porqué es importante aprender esto? a ¿Es importante aprender esto?*/Why don’t we change: Why is this important to learn? to Is this important to learn?” And here we have just part of the power of this protocol. Students were starting to see that there are patterns to questions, and by leveraging nuances in the language, they can get to the question they are seeking to answer!

Priorizando preguntas/Prioritizing Questions

Now we asked our students: “*Escojan tres de las preguntas más importantes o las tres que más les interesan.*/Choose the three most important questions, or the three questions that interest you the most.” Students identified their top three

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burning questions. The playing field changed. Suddenly, our students had questions that THEY created. Questions that THEY wanted answered. Students weren't just answering questions the teachers posed. Motivation was in high gear and we needed to get out of the way and let them at it!

Próximos pasos/Next Steps

As teachers who are implementing the AIMS4S^{3™} Framework, we created a document of all priority questions. During the next class session, we read their questions aloud and came to consensus on six questions that would best drive our learning about rational numbers. We then placed them on the Compendium in the inquiry section. The students' questions were now front and center to guide our unit.

We also typed, printed, and posted the questions that weren't added to the Compendium. We made sure that during the course of the unit, the students were given the opportunity to answer those questions as well. The lingering questions that were not answered in the unit of study became challenge questions or the focus of further research that students took on themselves to answer. By having our students generate their own questions, we shifted the power balance. Our students had questions to answer and they were THEIR questions, not ours.

Many students do indeed learn in the course of studying American history and government that they have the *right* to ask questions. But that is not enough. We should also deliberately develop their ability to ask questions. (Rothstein & Santana, 2017, pg. 154)

References

Rothstein, D., & Santana, L. (2017) *Make Just One Change: Teach Students to Ask Their Own Questions*. Cambridge, MA: Harvard Education Publishing Group.

Application of the QFT to AIMS4S^{3™}

If you are using the AIMS4S^{3™} Framework (Achievement Inspired Mathematics for Scaffolding Student Success), the QFT process is a dynamic way to teach students how to ask meaningful, high-interest questions about mathematics that you can use to drive your instruction. Here are some tips for using the QFT process with AIMS4S^{3™}:

- Carefully choose two or three Q Focus images that will target key ideas in the unit. Labeling the images, without teaching what those labels mean, can help increase the level of the language in the questions.
- Use a student question to kick off your lesson. "Today, we are going to explore your question, *Why do we have absolute value in mathematics?*" At the end of the lesson, make sure to come back to the question and have students share their current understanding.
- For questions on the Inquiry Chart on the Compendium, make sure to capture students' new learning in another color. It is powerful for students to see their understandings develop over time.
- Some questions will be answered during one lesson; some will be addressed over multiple lessons. Student thinking should drive the discussions rather than a simple restatement of a teacher-developed response.

The QFT Process is a powerful way to validate students' voices and put their questions at the center of instruction. With careful facilitation, students' questions can provide relevancy and purpose to what the class is studying.