Questioning for the Next Generation (QNG)

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Overview

After making the transition in my classroom to phenomenon-based teaching and learning, every unit has been built around an anchoring phenomenon and a driving question. Early on in this transition, I would present students with the phenomenon and the driving question on the first day of the unit. In most units, students would create an initial model or an initial explanation of the phenomenon but would not fully engage with the phenomenon before moving into the content of the unit. Seeking a solution to a similar problem in her own classroom, a colleague, Carrie DePetris, adapted the Question Formulation Technique developed by the Right Question Institute to match the science classroom. Her new strategy, Questioning for the Next Generation, is a protocol based in equity that engages students in phenomenon-based questioning with the goal of generating one class consensus question as the driving question for the unit. Note that other scenarios can be possible, and are presented below.

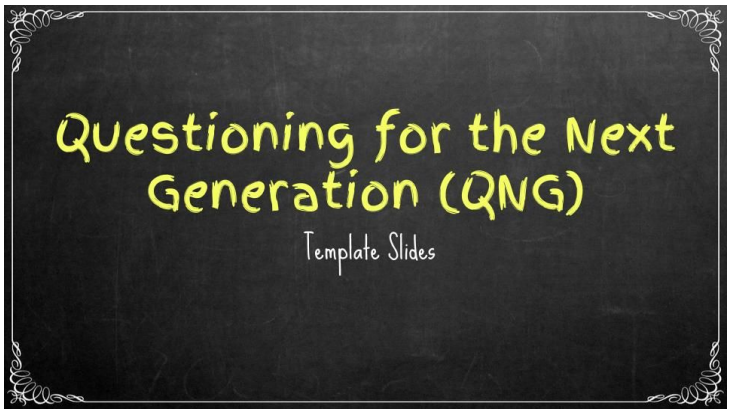
Questioning for the Next Generation (QNG) is a protocol designed to increase student ownership of the unit, and promote student engagement. During the course of the QNG protocol, students engage in the Science and Engineering Practice of Asking Questions. The protocol works to assist students to ask questions regarding a phenomenon and looks to increase student understanding of both open and closed questions. Further, it leads students to evaluate the quality of their questions. QNG incorporates the Cross Cutting Concepts in an organic way that not only increases student understanding of the role of the CCCs in science but sets up the unit to explicitly includes these Cross Cutting Concepts. The Questioning for the Next Generation protocol occurs at the start of the unit and is used to develop the unit's driving question. This protocol allows the students to engage with the phenomenon for a 45 minute class period, increasing student interest and curiosity in the phenomenon. The driving question is created by the students increasing student ownership in the content of the unit.

The Questioning for the Next Generation protocol is grounded in the practice of promoting student equity and a positive classroom culture. The one ground rule of QNG is "Absolutely, under NO CIRCUMSTANCES, may you discuss ANY ANSWERS! Today is about questions, questions and more Questions." By spending the entire class period with only questions, and not worrying about answers, every student can participate regardless of their content knowledge. This is especially important at the start of a unit when students have a wide variety of life experiences, creating equity for all students. The QNG protocol sets up a classroom culture where students make their thinking visible and there is no tolerance for judgments of other student's thoughts and ideas. The protocol has structured student to student discourse and student collaboration. In the end of the strategy, the teacher works with the class to create a class consensus question. During this part of the process, the students work on student to student discourse on the whole class scale.

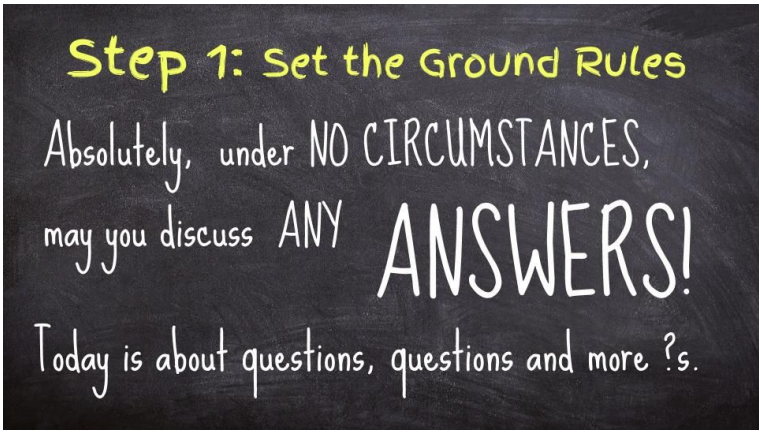
At the start of the Questioning for the Next Generation strategy, students sit in groups ranging from three to five students, with each group having a pad of sticky notes in the center of the group. In my experience, most groups use between 15 and 20 sticky notes during the course of the lesson. The teacher facilitates the protocol throughout the process using the QNG slides.

General Procedure for a QNG Lesson:

Set up the Classroom: Students sit in groups ranging from three to five students, with each group having a pad of sticky notes in the center of the group. In my experience, most groups use between 15 and 20 sticky notes during the course of the lesson. The teacher facilitates the protocol throughout the process using the QNG slides.

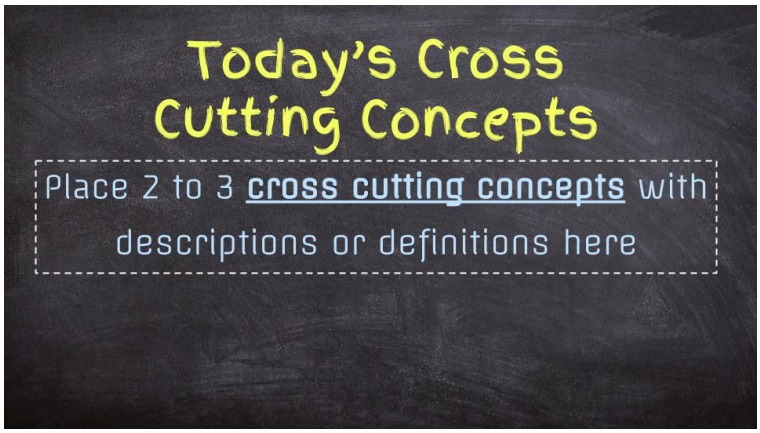


An alternative set up is to begin the class as individuals, and then proceed to groups. Initial questioning, described below, can be completed individually, providing time and space for the teacher to circulate and help prompt students. During this time, the teacher can provide sentence starters or prompts for students who may have trouble writing their own questions.

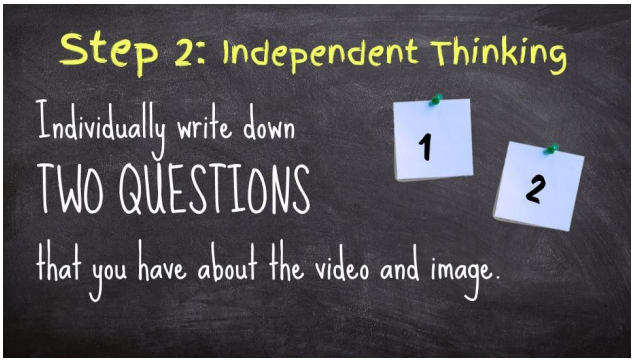


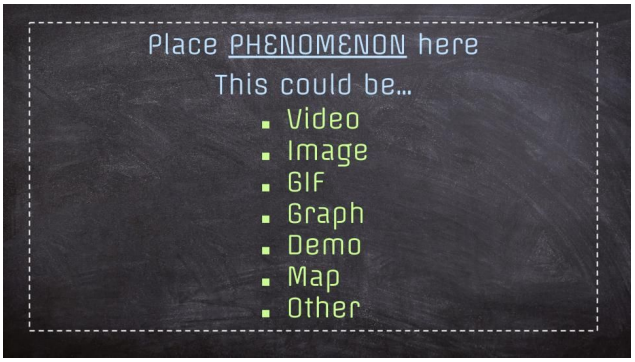
1. **Establish the ground rules for QNG:** Every time I run QNG in my classroom, we start with setting the ground rules. By midpoint in the year, some of my students smile, some roll their eyes and some actually speak right along with me. The purpose of this step is to remind everyone, including myself, of the one rule of the day. This rule sets up the basis for student equity during the QNG process. The protocol is not about how much a student knows but is about his or her ability to ask questions about a phenomenon. When a student asks a question and it is quickly answered by a classmate, it can shut down a student and make he or she feel like the question was "stupid" or was not a good question. Even though there is no judgement associated with answering a question, answers can quickly create inequality during the QNG process. Outlawing answers, for this one class period, allows every student to feel like his or her questions are valid or important.

2. **Present the unit's Crosscutting Concepts:** The goal of QNG is to create the driving question for the unit. In a strong NGSS unit, the driving question contains all three dimensions of NGSS. Before beginning the QNG protocol, I present the Crosscutting Concepts that are central to the unit. Majority of the time, I have 2 main CCCs for the unit established by looking at the performance expectations for the unit or by evaluating the explicit CCCs in the phenomenon. When I present the CCCs to

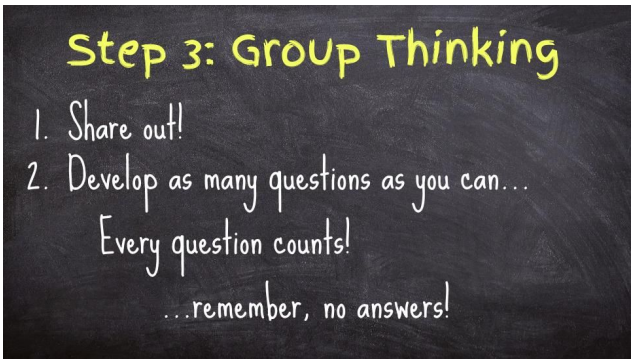


my students, we discuss how the Crosscutting Concepts act as "themes" for our unit and when we ask questions during the QNG protocol, we are going to try to ask questions using these themes. I present the unit's Crosscutting concepts using the CCC posters hanging in my room and use images of the posters on this slide during the QNG process.



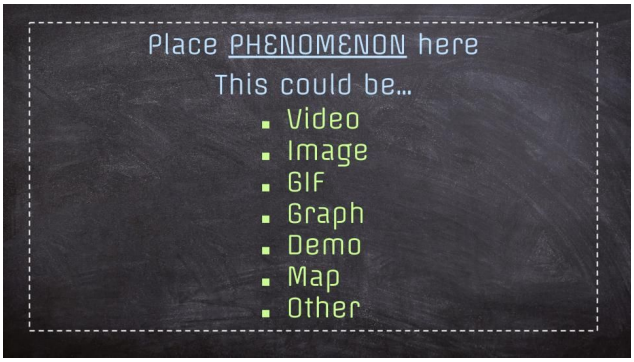


3. **Individual Thinking Time:** At this point, the students begin their work in the QNG process. Each student takes two sticky notes from the pile in the center of the group. During this step, student are presented with the phenomenon and, individually, write down two questions about the phenomenon. Normally this step takes from two to five minutes depending on the level of students and the phenomenon for the unit. Throughout the QNG protocol, each question gets written down on its own sticky note- this will be important when students get to step 4 (classification). If a student has more than two questions, he or she simply takes another sticky note and writes another question. The two questions is a minimum not a maximum for my students at this step. Depending on the level of the students, I might ask the students to come up with three or four questions instead of just two. As you present the phenomenon, it is very normal that the students start talking to each other about the phenomenon, especially because they are sitting in groups. The goal is to discourage discussion during the three to five minutes of individual thinking time. The concept that students start with individual thinking time is an important equity component of QNG. Each student has the time he or she needs to process and explore the phenomenon while developing his or her questions. Regardless of the speed at which a student works, when it becomes time to work together, every student has ideas to share that are a snapshot of the student's background knowledge.

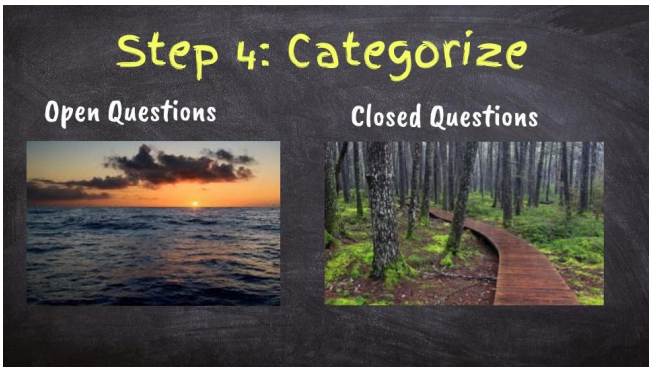


4. **Group Thinking Time:** Once each student has two or more questions written down, it is time for the students to work collaboratively. On average, the Group Thinking Time takes about ten minutes. The first part of the Group Thinking Time is for students to share out their individual questions. At this point, I remind students that the day's class is about every student having a voice. The classroom norm is that when one member of the group is sharing, all members of the group are actively listening. No question is judged, discussed or evaluated. To share out their questions, students go in a circle, reading one question at a time off his or her sticky notes, until there are no questions remaining. After each sticky note is read, the sticky note is placed in in the center of the group, symbolizing that the student question is now the group question. At the end, there is a collection of sticky notes spread out between the members of the group. No question is

covered up by another or placed in the center without being heard. This process of sharing out the questions, provides every student a voice in the process. This not only creates equity, but also creates student ownership of the questions being developed. After each group shares out their questions, the group as a whole works to develop more questions about the phenomenon. At this point, I tend to put the phenomenon back up for students to see. I also tend to loop back to the crosscutting concepts presented at the beginning. I challenge the group to develop at least one question about the phenomenon that contains each of the focus cross cutting concepts. Depending on the level of the class, I might ask the group to develop three to five questions. When the group is developing questions, they are using peer discourse to discuss observations about the phenomenon and delve deeper into what is being presented. This discourse is scaffolded at the start of the year, and as students develop efficacy, discourse happens naturally. A question proposed by one individual of the group might trigger a question in another member of the group. Due to the individual time, each member of the group can actively contribute but the results of the group as a whole is stronger than that of one individual student.

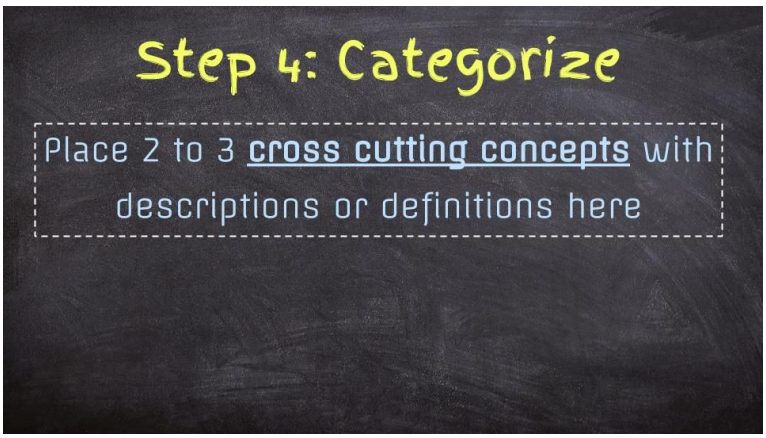


5. **Categorization:** At this point in the process, each group of students will have composed between ten and twenty questions written down on sticky notes in between them. The main "question development phase" has ended and this step begins the process of narrowing down the questions into the driving question for the unit. On average, the Categorization steps (I and II) takes about ten minutes total; students classify the questions developed in their group in two different ways.



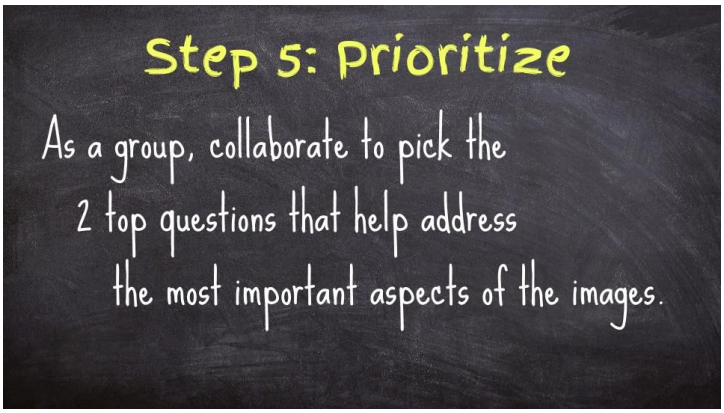
Categorization Step I: First, students classify the questions developed by their group by open and closed questions. I start this step by discussing with students the difference between open and closed questions; early in the year, this discussion is more direct instruction provided by me but by the middle of the year, my students are able to provide definitions for their classmates. An open question is open ended. This is normally a question that has a more extensive answer, or requires asking more questions in order to get to an answer. I tell my students that an open question might appear on a test as a short answer or an essay question. If an open question is typed into Google, a person would have to read a few hits in order to explain the answer. A closed question is a question that can be answered in a word or a few sentences. On a test, a closed question might be a fill in the blank, a multiple choice question or a true/ false question. If a closed question is typed into Google, you can normally answer the question using the first hit. I use the image of an ocean to represent open questions and a path to represent a closed question. It is important to find an set of images for open and closed questions for

your students to relate to. Many of my colleagues use different images here that work better for their students ans a visual reminder of what an open and closed question is. After defining an open and closed question, student work in their group to classify their questions. They do this by each question being read out loud again. Once the question is read, they discuss if the question is open or closed. Then the sticky note is moved into a pile either open or closed questions, depending on what the group decides. Just like before, it is important to remind students we are not judging or answering any questions - they are simply classifying the questions as open or closed. It is important to note that some groups will have a disagreement over whether a question is open or closed, which is perfectly ok. Some questions are ambiguous and I remind my students that this process is not about a right or wrong question. When a group arrives at a undecided question, encourage students to present the evidence and reasoning to support their claim of open or closed question.



Categorization Step II: After all groups have classified each question as open or closed, the next part is for students to classify the questions by the main cross cutting concepts for the unit. Just like with the open and closed questions, students read out each question, discuss and move the sticky note into the respective category. The results of reclassification will destroy the open and closed question categories which is totally fine. A question regarding a cross cutting concept can be either an open or a closed question. I normally allow students to have an "Other" category for the questions that do not fit into one of the presented cross-cutting concept categories. While we would prefer students to ask open questions and questions related to the presented cross cutting concepts, it is important to remember at this step the equity component of QNG. QNG is founded in the belief that during this process no question is judged; through the entire process, students will arrive at the driving question we as teachers are looking for. This process asks students to share and create questions at whatever level they can. To create the safe space required for this, we as teachers need to be careful not to talk about one category as "better" than another. If we tell students that our goal is open questions, or ask students to revise any question that is a closed question, we are judging the questions. At that point in the year, or with a particular anchoring phenomenon, a student might only be able to ask a closed question or a non-CCC aligned question. By the end of the year, and with certain classes, I may ask groups to revise questions to include a CCC. I do this only after this process has been well established and students understanding of the crosscutting concepts is well defined. By asking for a question to be changed, I am unintentionally telling the student who asked that question that his or her question was "wrong". This can cause a student to shut down and create an inequity in my classrooms.

6. **Question Prioritization:** After spending time thinking about the questions the group developed, the next step is to have the groups prioritize their questions. This step normally takes about five minutes. Each group is tasked with coming to agreement and selecting the "top" two questions that, if answered, would explain the phenomenon. I might subtly direct students to one component of the phenomenon that is important. Many times, I require one of the two questions to include one of the crosscutting concepts presented during the QNG process. This step is all about the groups sharing their ideas with each other.



There are many different ways you can have the groups report out. Most of the time in my classroom, I simply have students send one representative up to write the group's questions on the board. You can also have groups verbally share out, use an electronic platform such as Padlet or a Google form. Whatever medium you choose to use, it is important that you have a record of the questions for the next step. These prioritized questions become the pool of questions from which the class consensus is developed.

7. **Class Consensus Question:** The last step in the Questioning for the Next Generation protocol is the development of the class consensus question that becomes the unit's driving question. To develop a class consensus regarding the driving question for the unit, I use various student discourse strategies, such as talk moves. The teacher goal in this step is to highlight the components of the questions that the class asked that are in common or align with what the teacher determined to be the driving question prior to the start of the Questioning for the Next Generation protocol. In my classroom, students write this driving question on their summary table for the unit. Some colleagues post the driving question for the unit on their board.

   Sometimes there are questions that the students develop during the QNG process that are unexpected and deep questions or have high level of student interest. You can place these questions on a driving question board and return to them at other times during the course of the unit for student reflection or research. Some teachers use these questions as homework assignments or challenge questions during the unit. It is important to recognize that all student questions have worth, and not to simply discard them after the driving question has been agreed upon.

   By the end of this process the driving question has been completely developed by the students. Every student has had an active role in the development of the question, and therefore the unit is - by default - constructed around the investigation of a question of innate student interest, seamlessly creating student ownership and increasing engagement.