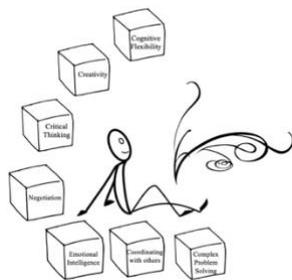


Scaffolding Maps and Graphs with Higher-Order Level Questions (Higher Education)



Donna Lee Fields, Ph.D.



theory behind the scaffold...

Higher-order level questions - those that elicit deeper thinking - help students to stretch their thinking and engage their curiosity, their reasoning ability, their creativity, and independence. These questions encourage students to open their minds, they offer opportunities to produce original thinking. A well-structured question sparks perspectives that might not have at first occurred to us; they encourage us to look at the issue from different perspectives. Higher-order level questions inspire fresh and sometimes even startling insights and ideas, they open roads for wider perspectives of the issue, and enable teachers and students to work together in constructing understanding. If we use effective questioning skills in the educational environment, we help our students to be more effective thinkers now and in the future.*

In the professional world, effective questioning skills can often be the difference between gaining employment or not. One of the highly ranked skills wanted by employers is to ask insightful questions that lead to various solutions of challenging events.

This scaffolding activity uses the [question continuum](#) – a range of interrogatories that graduate from lower- to higher-level thinking. The discussions these questions evince are especially useful for units filled with graphs, tables and other statistics - elements that are usually dense, and so very challenging to interpret. You'll see that the activity begins with the literal meaning of the data (lower-order thinking questions), and continue with interpretations and processing of the information (higher-order level thinking). In this way, students are gently pushed out of their [comfort zone \(ZPD*\)](#) and are more able to move forward in their learning.



*Zwiers, Jeff & Crawford, Marie (2011). *Academic Conversations: Classroom Talk that Fosters Critical Thinking and Content Understandings*, USA, Stenhouse Publishers.

**ZPD = Zone of Proximal Development: the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky).

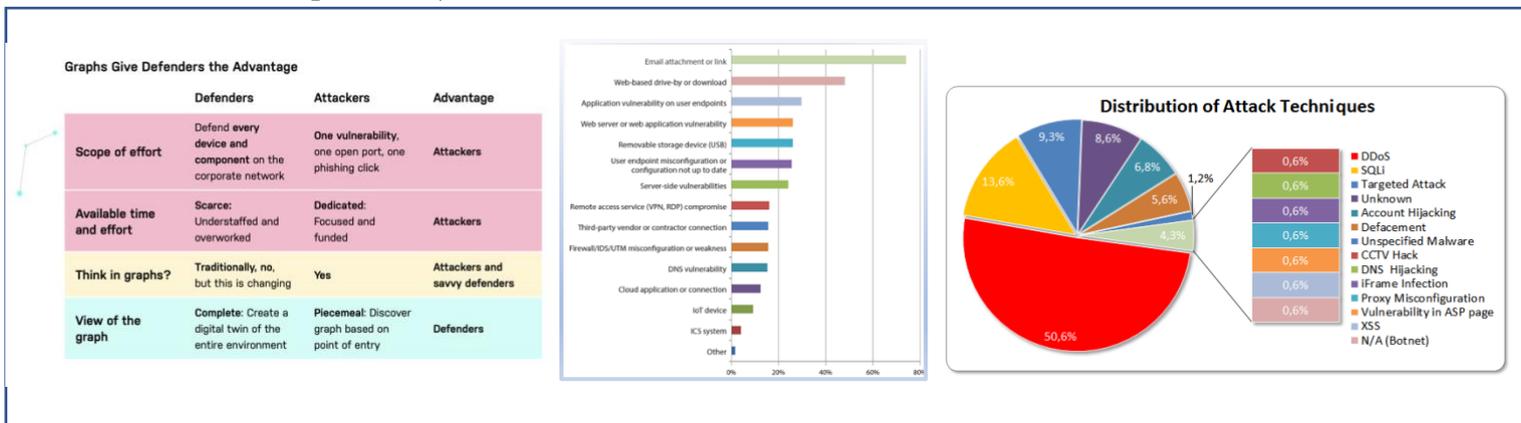
step by step...

1. Choose a graph or map from the unit you're about to begin that might be challenging for your students to understand. In the example below, you'll see that we've augmented the activity, including a compilation of three types of graphs, thereby extending the possibility of developing key skills.

NOTE: These maps and graphs probably seem simple to us, but there is a lot of inferencing, connections, and information that our students need to cognitively unwrap. Giving them time to process the different elements of the map or graph in smaller groups, enables them to consider the information more slowly so that later feel more confident in answering higher-level order questions.

2. Formulate questions using the question continuum (above) in order to guide them toward understanding the key elements you'd like them to assimilate.

example with graphs...(they will need to cross reference these maps to answer the questions)

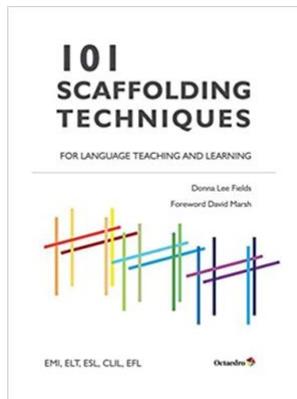


- Is it important to be able to distinguish between different types of cyber attacks?
- Which is more common - a distribution denial of service attack or those coming from e-mails and links?
- Who ought to be more concerned about legal ramifications of cyber attacks - attackers or defenders?
- When is the most propitious moment to augment cyber security?
- Where could third-party vendors find solutions for malware hidden in USBs?
- What would give attackers the advantage when a company is faced with understaffed cyber security?
- How have cyber attacks changed since the pandemic?
- Why do cyber security personnel keep a strict eye on the newest software and changes in applications?=?
- What if you were to create an online company. How would you protect your online services? What would be your biggest concerns, considering the product you would be offering?

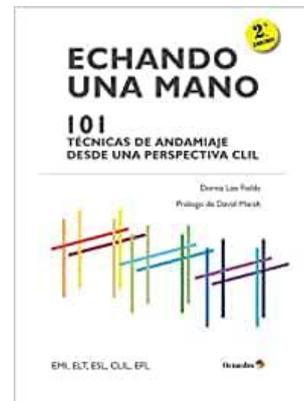
3. *Formative Evaluation/Reflection:* Students write two (2) lower-level thinking questions and two (2) higher-order thinking questions using the [Question Continuum](#).



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Hi, I'm Donna Fields and welcome to CLIL Scaffolding 8. It's a series of webinars designed to help give you support for using scaffolding in your classroom. Today we're going to talk about how to use scaffolding technique #56, that you can find in my book: 101 Scaffolding Techniques for Language Teaching and Learning that has also been translated into Spanish. The objectives for this session - as you know, I think it's very important to share our objectives and even collaborate making these objectives with our students - is to show how easy it is to scaffold graphs and tables using scaffolding technique #56. I'm going to give you an example for a primary and secondary lesson. You can use it with whatever lessons that you need it for.

Scaffolding technique #56 is called 'Ask Me Anything' and it's based on using question structures to interact with graphs and tables. The studies show that 80% of the questions we ask and textbooks ask in the classroom use lower order thinking skills, so today we're going to help push our students to use higher order thinking skills. Gathering, collecting and interpreting numerical information is a very important skill but still we want to use information that's relevant to our students and help them become more emotionally involved in it because that's when the students become more involved in their oScaffolding technique #56 is called 'Ask Me Anything' and we're going to use a secondary social science class. This graph has to do with the incredible imbalance in the United States between black men in prison and white men. So again, the point is to use real-life issues so that the students feel that their studies cross the boundaries of the classroom and that the subjects are relevant to them because when they feel that their studies are more relevant, they get more involved. Again, most of the questions the students are going to hear and read in their textbooks are lower order thinking skills. That's okay to a certain extent.

In pairs, first they're going to make questions using this graph - for instance they might ask some very easy and direct questions: What was the total amount of black men in prison in the year 2000? Or What's the difference between the black men enrolled in post-secondary education in the year 2000 and the year 2004? After they've spent about five or ten minutes writing these lower-order questions, asking each other and answering them (that's okay because they're interacting with the graphs), now let's push them to use higher order thinking skills.

Let's give them some questions that they may not have thought of themselves. You can write the following beginnings on the board. They finish them and then ask each other, using the graphs. So, for instance you can ask them to finish these questions: Do you wonder...? Why do you think there's a correlation between...? How do you see the difference between...? Is there reason why...? Did you expect...? Based on...how do you infer...? Is this similar to...?

In their pairs, they're going to finish these questions, and then join with another pair to ask and answer them. In this way, they'll be analysing the graph in a whole different way. Some of your students might have already structured questions that use higher-order level thinking skills but most of them probably haven't, so this is pushing them a little bit.

We can encourage them to use higher order thinking skills even more by increasing the sophistication of the questions. For instance: What does the graph not show? What else can you conclude from these findings? (Even with four people writing questions, there's going to be more information they haven't thought of.) How could you present this information in a different way? (Encourage them to be creative by using the information in another way - another type of chart or another visual representation of it.) Do you have any questions you might like to ask that nobody else is asked? (This helps the students feel more ownership about the task. If they haven't been heard or represented yet, here is their opportunity,)

Let's try this in a primary natural science class. We're going to use a pie chart about birds. We want to help students use higher-order level questions. A lot of the time we do the cognitive work for our students, and we determine the relationship ahead of time. This limits our students' imagination. They could give us much more creative analyses if we give them the opportunity. After they work in pairs asking each other direct (probably lower-level) questions we're going to push them into higher order level thinking questions.

After they've worked in pairs for 5-10 minutes asking each other the lower-level questions We're going to help them use higher order level thinking by using questions that require the word 'I' in the answer. 'I' statements are more powerful for the brain the studies have shown us.

When students use 'I' they feel more powerful and more recognized in the classroom, Here we're going to ask students to finish these questions, and then answer them: Could you explain how you...? What are your reasons for concluding that...? What evidence do you have for saying...? What do you see as other possible outcomes for...? Could you distinguish between...? What would happen if...? You could also ask them; What are other ways to interpret the data? This helps to challenge the students and in the end they feel more confident and competent in their analytic thinking.

That's it! Using this simple scaffolding technique, we've encouraged students to use higher order thinking skills, we've encouraged them to have a sense of ownership about their studies, and we've helped them use deeper analytic thinking.

So for all you SUPER TEACHERS out there. Thank you so much for joining! I look forward to any comments you have you can find me at:

comments you have. You can find me at these sites:

<https://scaffoldingmagic.com/>

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I hope to see you next time have fun in your classes! Bye!

**Zwiers, Jeff & Crawford, Marie (2011). Academic Conversations: Classroom Talk that Fosters Critical Thinking and Content Understandings, USA, Stenhouse Publishers.*