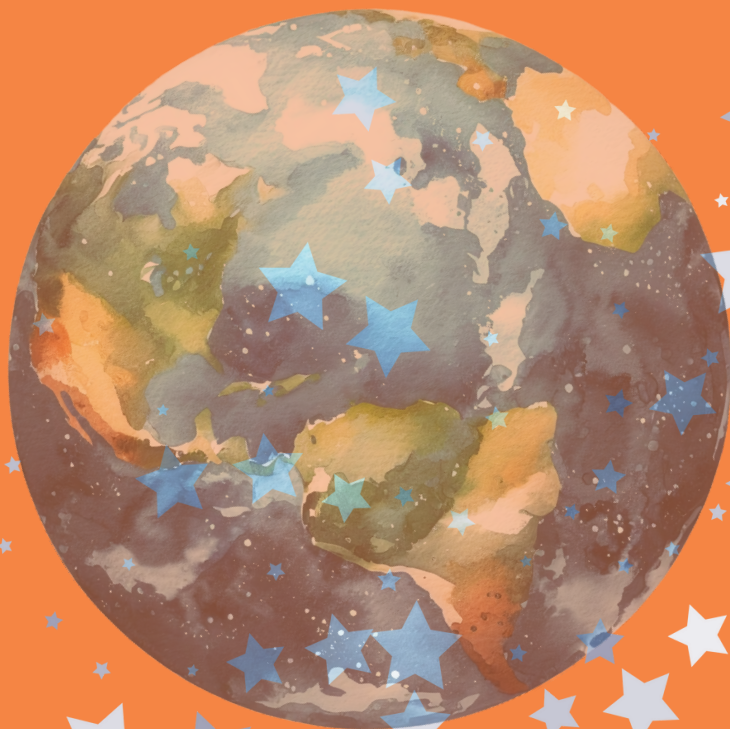


PROJECT-BASED LEARNING

The Comprehensive Guide to Phenomenon-Based Learning: Volume 4 DOK Tools for Higher-Level Thinking

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INTRODUCTION



What if...insanity ran in your father's family. Your mother, determined to make sure that you will not be affected by this trait, looks for every means she can find to give you the most advantageous future possible. What types of tools could she use?

Anne Isabelle Bryon, wife of poet Lord Byron, looked for just such a remedy to counteract the genetic predilections her daughter, Ada, might have inherited from a father, infamous for his unpredictable and eccentric behaviour. After a contentious divorce, Lady Byron - an extraordinary mathematician in her own right - intentionally surrounded Ada with people who would stimulate her cognitive skills, thus disciplining what might have otherwise been a wandering mind.

Her mother's efforts were successful as Ada Lovelace became one of the greatest thinkers of her time, and in fact is credited with being the first computer programmer.



How did this happen? How can our habitual thinking patterns so profoundly affect our possibilities?

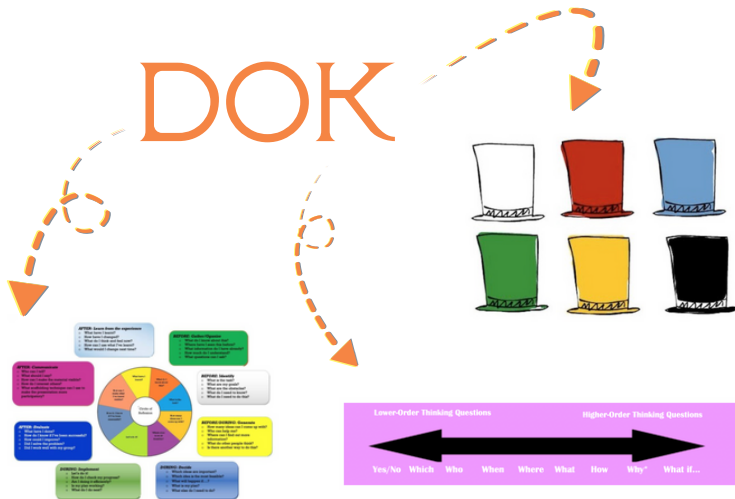
Heuristics

...methods or strategies that often lead to solve problems. They can be thought of as general cognitive frameworks that humans rely on regularly to resolve challenges in every day life.

Antithetical to higher-level thinking.

Let's consider the depth of problem-solving tools we include in the learning environment. What are our overriding goals? What are our expectations of our students in reaching those goals?

With them, you'll be able to establish cognitive routines for your students that will habitually lead them from superficial knowledge to deeper, more lateral, analytic, and original thinking...just as Anne Byron did for her daughter - though you have something she did not: structural supports to quickly set up these dynamics.



By being aware of these DOK tools and learning how to use them to their best advantage, you will infuse in our PhBL projects creative conclusions of collected information, and also opportunities for your students to develop the skills that will gear them towards the needs of future leaders - at local, national and international levels.



They were risk-takers, daring thinkers, self-motivators, with the mission of extracting creative and innovative theories that far surpassed the *status quo*.

The Human Mind Needs Structures to Reach Higher-Level Thinking

The success of these flexible thinkers led to the study of their methods in facing cognitive challenges. These developed formalised strategies, and are today commonly referred to as 'depth of knowledge tools' - structures that provoke us to push past the boundaries of heuristics, so that we proactively expand our thinking.

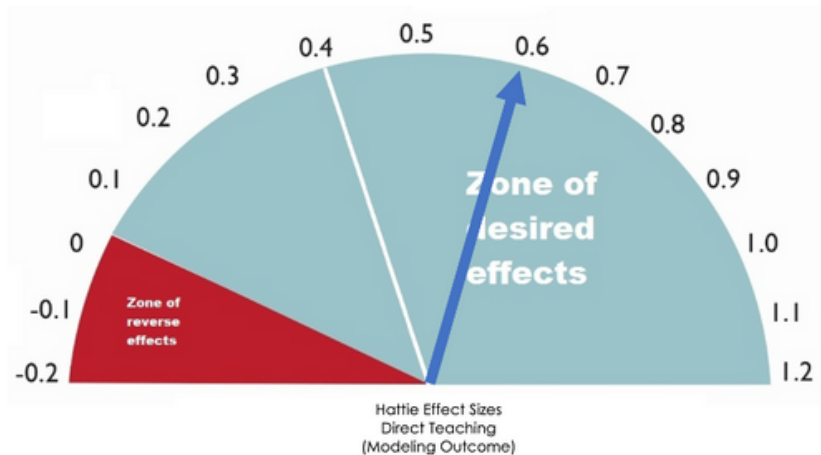


For educators, this means that we now have at our disposal tools that can exponentiate the profundity of the thinking of our students, steps that we can regularly embed in our lessons, units and projects so that our students also become habituated to use internal cues whenever faced with challenges.



We also model these structures by regularly letting our students see us pausing to review, reflect, analyse, weigh, consider, negotiate, debate, observe, stretch, and question issues.

In fact, modelling the insistence of depth of knowledge in tasks and thinking, is one of the practices proven to have one of the most profound influences on our students' learning.



John Hattie, one of the eminent researchers of best practices in today's classrooms, explains that this effect size - Modelling Outcomes, giving concrete examples of a task or evaluation or dynamic - raises students' outcome qualitatively as well as decreasing their levels of anxiety.

(Click on the link above for more information on effect sizes as well as Volume 5, where we go more into depth on the power of paying attention to Hattie's studies.)

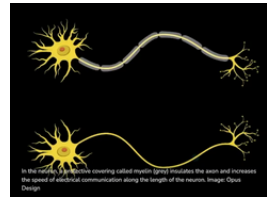
Kanheman's discernment of our brain's tendency toward stagnation is supported by other erudites in the field of critical thinking. As we saw above, Daniel Williamgham surmises his realistic assessment of the biological tendencies of the human mind by saying that ‘by nature, we try to avoid thinking. We try to solve problems using our memory.’*

Memory is comfortable.
Memory is familiar.
Memory has a cognitive
revolution that is imprinted
on the mind so that
answers arrive without
much effort.

Why is this so? Well..

...let's go back briefly to the concept of ‘myelinated neurons’ that we explored in Volume 2.

The concept of repetition - denoted in this discussion as *heuristics* - can be evolutionarily explained by going back to our hunter-gatherer beginnings. Really!



At that time, our only needs were immediate and biological: sustenance and safety. To survive during those primitive times, we had to internalise repetitive

*Willingham, 2007

DOK Tools and Phenomenon-Based Learning Projects

Depth of thinking tools are integral to the Phenomenon-Based Learning structure. From the very beginning of a project, they aid in the active participation of the students, giving them direction, so that paths of research are more varied and expansive.



Using DOK frameworks sets up patterns of approaching new information so that the thinking becomes more automatically geared toward alternative perspectives. In PhBL projects they are especially useful as they aid in the mixing of interdisciplinary subjects and in addressing multi-cultural elements in original tones*. In particular, the deliberate push towards higher-level thinking opens gateways to including 21st century skills** in natural and dynamic ways.

So, how do we include DOK techniques in our PhBL projects?

*Moseley et. al., 2005 (p. 1)

**See Annex 1a



As promised in the Introduction, the following are a living examples of how you can specifically embed different types of DOK in your lessons - from teachers just like you, who doubted and then were ecstatic about the impetus the techniques created for their students.

Which one do you like the most? Which one makes the most sense to you? Which is the one you will use in your next lesson?

DOK tool 1: Circle of Reflection

Project 1: Weather Island



The first DOK framework we are going to explore is adapted from Belle Wallace's TASC Wheel (2000), a structure used in schools all over the world to support the 'development of independent, creative thinking and personalised learning, to



In other words, Naim made a deliberate shift in paradigm, working with her students, building a community of learners by giving them opportunities to have agency over their own learning and the outcomes of their products.

What Naim reported to me afterwards was that, for the most part, in all future projects, her students acted consciously, deliberately, respectfully, and were learning the paradigm of self-agency - feeling confident that they could find solutions instead of depending on her to be the 'source of all knowledge'. The DOK tool was critical in this shift.



Naim's comments about the first session of this project:

Originally, I had planned this session to be a 5-minute introduction of the rubric, with the remainder of the class used as a work session. In the end, the scaffolding activities using the DOK tool, took most of the class period; however, without these two scaffolds, my students would have been working

with very little understanding of what they were doing. Their acquisition of new knowledge would have been virtually nil, so really, what was the point?

To be perfectly honest, I didn't like having to backtrack and create activities that would repeat the rubric three times, but

DOK tool 2: Bloom's Taxonomy of Critical Thinking

Project 2: Identifying Flowering plants and Conifers through Polyptychs



The second DOK tool we're going to explore, is probably more well-known: Benjamin Bloom's taxonomy of critical thinking.

You'll see that there's a critical difference between the Circle of Reflection and Bloom's Taxonomy:

...while the Circle of Reflection wheel is often used with equal ease by teacher and student, Bloom's taxonomy is more effective when used exclusively by the teacher.

Following Bloom's taxonomy from bottom to top aids you, the teacher, to very intentionally expand your thinking your expectations of a project and how you plan accordingly. You might see that its use behind the scenes is sufficient, and there's no need to present it to students because it might only add confusion.

Case Study: Raija

Raija, who teaches in Liminka, a small town in northern Finland, close to the border of Lapland, wove into her project a rich interdisciplinary and multicultural project using



Bloom's DOK tool to give herself a push her towards lateral thinking while planning a unit of Natural Science - flowering plants and conifers.



Raija had a significant challenge with this unit, as the country itself does not sport a vast heterogeneity of flora and fauna as other countries do.

So, it was not so much the language or even the content that was going to be demanding in the designing of the project, but rather designing it so that her students felt a visceral connection to content even though there were limited live resources on half of the subject.

The approach Raija took, therefore, was to focus on the the global aspect of the PhBL philosophy: to design a project that has a gobal focus by including in the criteria evidences of how flora appeared in international communities. This both solved and enriched the work.

If we incorporate elements of the PhBL structure step by step, at our own pace and our own process, we form a firm platform upon which we can construct powerful learning opportunities for our students.

So now, which element of the PhBL vision did Ana's team include that not all teachers are comfortable with?

Co-creation



Co-creation of the Enquiry Question?

Co-creation of the Final Task?

Co-creation of the Formative and
Summative Assessments?

In the case of Ana and her group, the co-creation was all inclusive.

The Question Continuum is used - just as all DOK tools - to transform your students' studies from single- to multi-layered thinking. With questions from this framework that provoke higher level thinking, your students will collate facts creatively, give thoughtful consideration to different perspectives obtained through their research and investigation, and, in short, build from a wider pallet from which they can produce original conclusions -and make them visible through the Final Task.

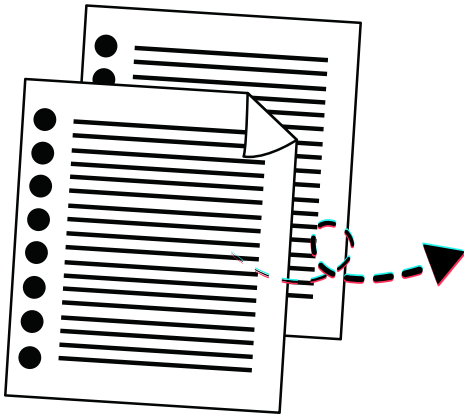
Another advantage of the Question Continuum is that it is as easy for students to use as for teachers.

Let's look at Maribel's experience using it as the DOK tool of choice in a PhBL project she designed after a series of workshops we worked on together.

Case Study: Maribel

Maribel, a Secondary, bilingual teacher, works in an old monestary, now a school, on the east coast of Spain, in an entrenched teacher-centred educational system. She is one of the few exceptions in her school's inexorable insistence of passive-learning, as she is an educator who thirsts for new ways of enriching the learning environment for her students.





Formulate 10 sentences with 1st, 2nd and 3rd conditional. Include...

- Different outcomes in occurrences of natural disasters in your town.
- Different aftermaths if world leaders had warned your community earlier of this natural disaster.
- Different priorities in the structure of triage.

Maribel deemed this to be the seed that would germinate the whole PhBL project. She suddenly knew she had the beginning of a fascinating project.

After pondering the initial idea from many different angles, she decided that amping up the concept of the ethics behind medical decisions and how they affect a society in the long term, was a way of involving the students both cognitively and emotionally - this latter factor being key to engaging students.

As excited as she was to share this phenomenon with other teachers Maribel knew that if she wanted them to be more willing to participate, she would have to advance the project significantly and include their disciplines for it to make sense that they participate.

Conclusions

As in all the volumes of this series, the information shared here is to expand on the structure of a Phenomenon-Based Learning projects. Each volume delves into different, perhaps hidden, aspects of the projects you can adapt to your lessons to help your students to have more agency in their learning.

With PhBL projects, students are ideally more encouraged to see how material presented to them in school can benefit them in their own lives, and how participating in working collaboratively has a positive impact on their future. This volume has stressed the importance of inculcating in students the habit of thinking more deeply, more creatively, to move from habitual actions based on heuristics to thoughtful, lateral, more open-minded and encompassing conclusions. It has presented to you highly effective tools to encourage this pattern of thinking.

You've examined six different DOK structures - each with different uses and values - and hopefully you've chosen at least one that will aid you in widening, expanding, delving into more lateral perspectives of your subject/s *today*. Ideally, you are also more inspired to reach out and work with other teachers so that the learning of disciplines is more integrated and so more authentic - for you and for your students.

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