

The school curriculum where I live directs students to study the life-cycle of a cold-blooded vertebrate, so I will take for my topic freshwater eels (Anguillidae — a word I would have students learn). The purpose here is simply to indicate how the “Romantic cognitive tools” framework can help one to shape the topic to make it imaginatively engaging to students.

The framework encourages us to put some of our emphasis on how to tell a good story as well as on how to attain our objective—while using the good story as a better way of attaining the objective. The framework asks the teacher to begin planning by reflecting on the importance they themselves can identify in their own lives and experiences for the topic to be dealt with in class. This needn't be some heavy-duty self-interrogation, but rather a moment of reflection on something about the topic that can emotionally engage the teacher, even in a small way. Implicit in such an approach is the assumption that teaching will be likely more successful if teachers have located some emotional response to the topic within themselves. We know that our imaginations are engaged by something when we identify some emotional tie to it. Engaging the students' imaginations will likely happen more easily through showing them the emotional importance of the topic. And, if we can identify nothing of any emotional importance to ourselves, then we will likely have a hard time engaging students' imaginations.

1. Identifying heroic qualities

What heroic human qualities are central to the topic? What emotional images do they evoke? What within the topic can best evoke wonder?

In order to help students connect emotionally to the material, teachers need to first identify their own emotional attachment to it. What heroic human quality or emotion—courage, compassion, tenacity, fear, hope, loathing, delight, or whatever—can we identify in the topic of eels? These “romantic” qualities help us—and our students—see the world in human terms and give human meaning to events, facts, and ideas in all disciplines. This first task is the most difficult part of planning the lesson or unit. We are asked to feel about the topic as well as to think about it. If our aim is to engage students' imaginations, we must first alert and exercise our own, and identify the transcendent qualities in the topic that provide a key to imaginative stimulation.

Identifying transcendent qualities:

- 1. Main heroic quality:** ingenious persistence in discovering about the life-cycle of the eel
- 2. Alternative(s):** astonishing journeying of the eel

Images that capture the heroic quality:

The Danish scientist Johannes Schmidt on the decks of various ships criss-crossing the Atlantic from Iceland to the Canary Islands, from North Africa to North America, pulling endless catches aboard and examining their contents in his unrelenting attempt to unravel the mystery of the life-cycle of eels. He began his search in 1904 and continued for twenty years, suspending his voyages reluctantly during the First World War. His unremarked voyages, single-mindedly pursuing knowledge about eels, challenge those of legendary Sinbads or Jasons, and those of Drake, Magellan, and Cook. And what was he doing all those years, braving the Atlantic ocean in all weathers? He was looking for younger and younger eels, elvers, larvae, and tracing them by age in order to locate their breeding grounds.

2. Organizing the topic into a narrative structure

2.1 Initial access

What aspect of the topic best embodies the heroic qualities identified as central to the topic? Does this expose some extreme of experience or limit of reality?

For the first lesson of a unit or the opening part of a single lesson, teachers are asked to search their own

imagination for images that catch the heroic quality that will provide the dramatic structure for the unit. Remember, it is as important to feel the heroic qualities as well as think about them. Rather than focus exclusively on the content and how we will organize that, we should also search our understanding of the topic and its content for those images that best capture what is important about it

Exotic/extreme content that best embodies the main heroic quality:

We might begin with the mystery of eels' sex-lives. In the ancient world much knowledge had already been accumulated about all kinds of creatures, but eels presented a bizarre mystery. Eels were very common but no one had ever found a baby eel or even a pregnant eel. The Egyptians, Greeks, and Romans considered eel a delicacy, yet despite becoming expert at catching them, they discovered virtually nothing about their life-cycle. Aristotle proposed that the eel was sexless and that its young were created spontaneously out of the mud in river bottoms. Pliny suggested that, when they wanted to procreate, eels rubbed themselves against rocks, and young were formed from the skin thus detached. Other explanations of their birth included that they come from putrefying material in rivers, that they come from the gills of other fishes, that they grew from horses' hairs that dropped into water, or, delightfully, that they were sinful monks whom St. Dunstan in a rage had transformed to do eternal penance (so giving the English cathedral town of Ely its name — the eely place).

2.2 Composing the body of the lesson or unit

How do we organize the material into a story to best illustrate the heroic qualities? Sketch the story, ensuring that the qualities will be made clear by the narrative.

The principal heroic quality should provide the drama and conflict in the story. Remember, the heroic qualities should be those that most effectively convey the content of the topic. In making this brief initial sketch, try to capture just the main narrative thread that will carry the students' understanding from the beginning to the end of the lesson or unit.

Our story structure is the solution of a 2,500-year-old mystery, solved only in the 20th century through the heroic persistent ingenuity of Johannes Schmidt. At the end of the century a tiny, transparent, leaf-like fish, quite unlike an eel, was caught in the western Mediterranean. A few earlier similar specimens had been seen and designated a new genus. This particular specimen was reared in captivity, and by a series of amazing transformations grew into an elver and then into an adult eel. (The larva are called leptocephali — another word for students to learn.) But if eels were so common, why were specimens of eel larvae so very rare? We can take a chronological perspective on the unravelling of the eel's life-cycle, though each new discovery only seems to leave us with further puzzles. And we have set up our narrative so that Schmidt becomes heroic through the ingenuity and persistence he displays in tracing the early life of the eel. It might be useful to set-off Schmidt's voyages and discoveries against the social and political background of his time, which forms the focus of most people's attention. While the politicians and soldiers filled center-stage, wreaking that terrible destruction of the First World War, Schmidt's gradual piecing together of the eel's life-cycle added something perhaps small to our accumulating knowledge. The counter-pointing of his slow, persistent inquiry against the cataclysmic events that fill our history texts, might lead to brief meditations on the value of different kinds of activities, and so stimulate some wonder.

Our narrative will follow Schmidt's early explorations in the Mediterranean. He discovered more larvae and found that on average they were larger in size the further east they were caught. So he sailed out into the Atlantic, finding ever-smaller larvae drifting in the currents. Schmidt persuaded more than twenty ship-owners to collect samples for him, and to chart where each was found. He began to home in on the area where the greatest concentrations of tiny larvae were found, locating their breeding ground between latitudes 20o and 30o North and longitudes 50o and 65o West, in the strange floating weeds that constitute the Sargasso Sea.

2.3 Humanizing the content

What aspects of the story best illustrate the human emotions in it and evoke a sense of wonder? What ideals and/or challenges to tradition or convention are evident in the content?

Think of how a good movie or novel makes aspects of the world engaging. Obstacles to the hero are humanized in one form or another, almost given motives; they are seen in human terms. To do this, we don't need to falsify anything, but rather we highlight a particular way of seeing it—because this is precisely the way students' imaginations are engaged by knowledge.

What content can be best shown in terms of hopes, fears, intentions or other emotions?

A sense of romance can be caught up in the details of Schmidt's voyages and discoveries, in the dedication, the ingenuity, the persistence, the endless miles of the massive Atlantic ocean in search of tiny larvae. Wonder can be stimulated by the strange life-cycle gradually uncovered; the floating larvae carried on currents for months or years and for up to three or four thousand miles, their bizarre transformation from larvae to elvers, their finding — for thousands of years that we know of — the same rivers of Europe and America, their peculiar sexual progress from neuter, to precocious feminization, to hermaphrodite, before settling for male or female conditions, their unflinching migration back to the sea after about ten years in their freshwater home rivers. Awe might be stimulated by just considering the purpose of all this remarkable complexity in eels' life-cycle. Why?

3. Pursuing details

What parts of the topic can students best explore in exhaustive detail?

While it is easy to give students a project to do that is part of a topic, it is a little harder to think about what aspect of the topic they might be able to exhaust, i.e. be able to find out nearly everything that is known about it. But there are such parts in every topic, and the security and sense of mastery that comes from knowing nearly as much as anyone about something is a great stimulus to inquiry. Think of something that is intriguing, that can be seen from a variety of different perspectives, or that is alluded to but not examined in detail in the content or in your teaching of it (referring to your notes from 2.2 and 2.3 above should help).

List those aspects of the topic that students can explore exhaustively:

This topic provides a wealth of details that might be fairly exhaustively pursued: charting the changes from larvae to elvers; the foods of eels at various stages of life; Schmidt's voyages; the variety of forms of larvae, from threadlike to saucerlike forms, and the adult forms they grow into; the families of eels; the Sargasso Sea; and so on.

3. Concluding

How can one best bring the topic to satisfactory closure? How can the student feel this satisfaction?

One wants to end a topic in a "romantic" way, which can have two forms. The first form is to re-examine the images we started from and review the content through the lenses of other heroic qualities, including some that might give an opposite or conflicting image to that of our earlier choice. The second form is to show how the romantic association the student has formed can help them understand other topics in a new, more imaginative, way. Or one can use both, of course.

Concluding activities:

One might provide in conclusion a different narrative, this time bringing together the sequential outline of the eel's life-cycle, from Sargasso Sea to American and European rivers, and back again. In this telling we might highlight those aspects of their life-cycle that are still not known or understood. We still lack, for example, a clear image of how male and female eels reproduce in the Sargasso Sea. We do not know how many of, or even whether, the European eels who set off on their long migration back to the Sargasso Sea ever make it. We do not know the mechanisms that trigger and guide their migrations; we might connect this with other creatures with exotic migration patterns — salmon, birds, butterflies, etc.

4. Evaluating

How can one know that the content has been learned and understood and has engaged and

stimulated students' imaginations?

Any of the traditional forms of evaluation can be used, but in addition, teachers might want to get some measure of how far students' imaginations have been engaged by the topic, how far they have successfully made a romantic engagement with the material. In addition, the concluding activities (above) are also evaluative in nature. Various kinds of information, including that derived from discussion, debate, art work, journal writing, etc., can be gained as the unit is being taught. The teacher can also measure the amount of non-required reading students engage in. They might also record what other reading or video-watching they may have performed related to the subject matter of the topic. In addition they could ask the students to keep personal notes in which they record in an open-ended way any ideas they have had about the topic they are studying.

Forms of evaluation to be used:

We might employ various methods to evaluate a unit such as this. We will want to ensure that students have learned in detail about eels and their life-cycle, and also that they know which features of eels' lives remain mysterious. We can use traditional forms of evaluation to inform us about students' knowledge, using tests, examining their written work, grading projects, and so on.

Because we have been trying to engage students' imaginations with eels, we will also want to evaluate how successful we have been in this regard. Obviously we do not have well-trying and tested evaluation procedures that will give us precise readings of imaginative engagement, and probably never will have. But we might experiment with plausible ways of getting some kind of reading. We might begin, simply, with teachers' observation. It is usually fairly clear whether or not students are imaginatively engaged in a topic; the degree of their enthusiasm, the way it invades their intellectual activity in general, their pursuit of aspects of it well beyond what is required, their questioning and searching out additional sources of information, their desire simply to talk about it, are all indicators of some degree of imaginative engagement. Students' written work, or other forms in which they present what they have learned to the teacher or to the class as a whole, can yield evidence of imaginative engagement; going beyond what is required, especially when the direction has been determined by the student's perhaps idiosyncratic interests, or taking great care in, for example, drawing different forms of larvae or species of eel, or evidence of knowledge that has been culled from diverse sources not readily available, or evidence of a kind of obsessive interest in some feature of eels' lives, would all provide some indication of imaginative engagement. Some of the above characteristics of students' work could, of course, be due to other factors, like desire for a high grade or compulsion. But it is an unusually unobservant teacher who cannot tell the difference. These points echo in brief ideas that are elaborated and developed in Eisner's "connoisseurship" model of evaluation (Eisner, 1985).

This is an area in which one might encourage students' self-evaluation. Ask them to reflect on how far they felt they had been imaginatively engaged in the topic, what features of it engaged them most, what had they most enjoyed learning about, and so on. This might also become a useful small group activity, in which each other's interests might incidentally be communicated to the group.

A part of the attempt to evaluate a unit such as this must involve trying to discover how far students grasp the underlying scientific virtue of pursuing knowledge purely for its own sake, and recognizing persistence and ingenuity as appropriately serving this pursuit. Also we will want to evaluate how far students associate with these transcendent human qualities. We can try to get some reading of these from students' work, from their classroom behavior, and from effects on what they more readily turn their minds to in leisure time. The sensitive teacher will no doubt be able to get an adequate reading on their success, even though it will not be in terms of some precise score. (We decide what it is educationally valuable to do on grounds other than what we can evaluate precisely.)

There has been a considerable development in recent years of what are generally called "qualitative evaluation" procedures. Many of these would be useful here. A clear introduction and discussion of some of these procedures is available in Schubert (1986), and more elaboration and detail is available in Guba and Lincoln (1981) and in Patton (1990).