

# Introducing Threshold concepts

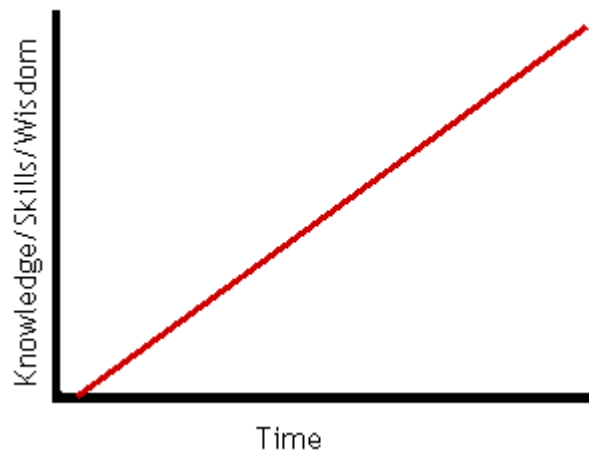
Most of our planning for teaching is pretty crude. No, frankly, it's hopeless. We—and particularly our managers—like to pretend that it isn't. We (they) devise fancy forms for "Schemes of Work" and "Lesson Plans" full of "SMART" objectives and incomprehensible coded cross-references to the syllabus. But we know that however carefully we have "planned", by the third week there is only the most tenuous connection between the reality of student learning and the fantasy of our teaching plan. But sometimes (not often, but sometimes), by week seven, they are back in step. What happened?

First, we got arrogant. Under pressure from management regimes in education which are desperately trying to catch up to systems which business abandoned in the late 'sixties, teachers have had to specify in ever greater detail what will be "achieved" in every session. It is, of course, nonsense. There is no way in which we can specify what any individual student will learn within a given hour of teaching (and pandering to their so-called "learning styles" will not make it happen, either). But we have been conditioned to believe that we can create a sausage machine of such efficiency.

Second, in our obsession with "delivering" teaching, we forgot about how students acquire learning. We even have courses on "[delivering learning](#)"! No! I can deliver food. You have to eat it. Unless you eat it, it makes no difference to you (for better or for worse, given the current concerns about obesity, but we won't go there). Teaching is cooking. Learning is eating. ...

Underpinning both misconceptions (alongside all the stuff from on high) is a simplistic view of learning. It's wrong, but the more we explore how and why it is wrong, the more interesting—and useful—the story gets.

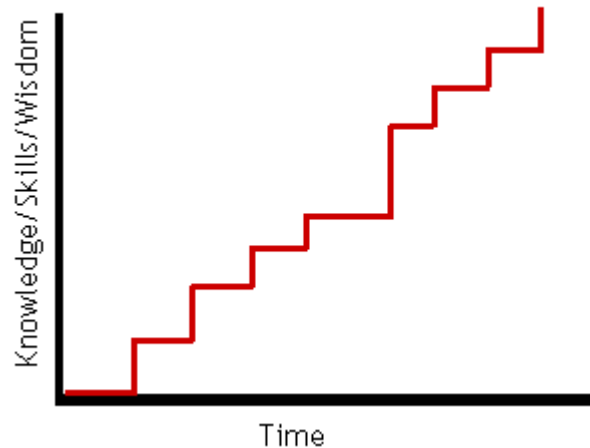
At the heart of that view is a model of learning which can be represented thus;



It assumes a steady and inexorable incremental progression. Indeed, in some limited cases it does apply; it broadly works in the acquisition of precise but limited manual skills, such as gutting fish, where experienced practitioners just get better and faster – within very clear limits. It broadly works, too, for memorisation; but even here there are features such as cueing (where one item brings to mind a series of others) which introduce "lumpiness" into that pristine line.

But most skills and knowledge are acquired in a more complex context than fish-gutting. (And once the really tricky problem of how to grab and align a slippery silvery slithery creature, fish-gutting may be a job for robots. Indeed, the straightness of the learning "curve" may be an indication of the suitability of the task for computerised mechanisation.)

Most real-world learning, examined up close, follows a "stepped" pattern or a "stick and slip" process.



The steps are not uniform, and not everyone's steps are the same. The risers, when learning suddenly accelerates, are those points at which the "penny drops", or you "get it" or "get the knack", and they are not entirely predictable. And because they are not predictable, they can play havoc with our planning. Usually they are followed by a period of consolidation before the next breakthrough, but organised systems of "education" tend to press on with teaching the syllabus, regardless of whether all the learners have successfully negotiated their steps. So some learners may, for example, have memorised (or as one writer put it, "mimicked") some material without ever fully understanding its significance; they will pass our assessments but what they have "learned" remains largely a mystery to them.

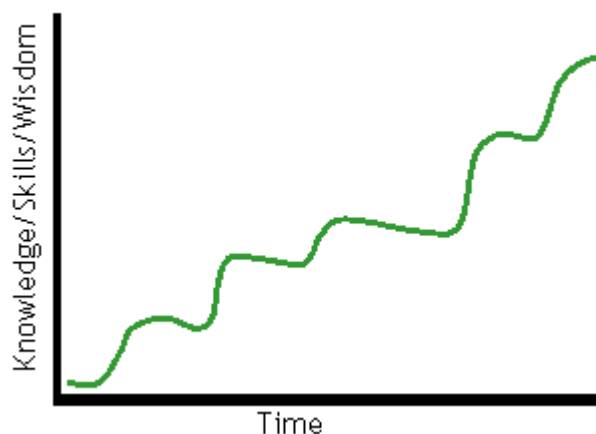
As one of my students, an engineer, commented of one of his students; "he'll pass all the assessments, but he'll never think like an engineer". Getting a students to "think like" an engineer, a nurse, an economist—even, heaven help us, a lawyer—may be our ultimate goal. It is the acquisition of what Entwistle (2004) calls a "way of thinking and practising" or WTP, if you like jargon to impress with.

But so far we have treated the steps as rather mysterious and arbitrary features of a learning career. Examine them more closely, however, and they prove not only to be rather more complicated than simple steps, but also much more revealing and interesting, with direct implications for practice. This examination has been started by Meyer and Land, and is rapidly growing into a very substantial area of research; what follows is an attempt to introduce it as simply as possible, albeit slightly indirectly; as Einstein reputedly said, "Make everything as **simple** as possible, but not simpler".

Einstein developed the theory of relativity from a thought-experiment, imagining what it would be like to ride on a beam of light. Try a similar thought-experiment, and put yourself in the position of a learner climbing the learning curve we have looked at. The first thing to strike you is that the uniform slope is very boring; and that indeed is the experience of many of our students whose experience of a subject is squeezed into the limitations of the syllabus and a pre-determined teaching schedule and assessment regime.

But at least the slope is fairly manageable. The steps are much harder, and sometimes they seem so big that you may be daunted by the prospect of ever getting up them; the knowledge they embody may in that sense (and some other senses, as we shall see) be "troublesome" (Perkins, 1999).

However, neither model, slope or steps is anywhere near rich enough to describe what the climb is like. It would be more realistic to depict it as like a fell-walk. It has elements of slope and step, but also it has a series of summits; one of the most frustrating but also rewarding aspects of a walk is to breast a summit which you thought was the top of a hill, but which really just concealed another behind it. But it was nonetheless an intermediate summit, and from it you can see both ahead and behind in a new way. It has revealed a cwm ahead which gives you a clearer idea of where you have to go, and you can now look back at where you have come from and see how the path led here.



In learning terms, that summit you have just breasted is a "threshold concept".

## What kind of learning is a threshold concept?

It is not just a core concept, as in an important item on the syllabus which you must learn, although it may be that. And of course it is specific to a particular discipline.

So far, an important component of the research is the task of working with subject experts in particular disciplines to identify their threshold concepts;

- Clouder (2005) argues that "caring", with all its emotional baggage, is a threshold concept for health-care professionals. Until students grasp what is involved in participating in a professional caring relationship, they have nothing on which to hang the rest of their learning, but engaging in that relationship can be (indeed perhaps it needs to be) deeply unsettling.
- That may be "obvious". Less obvious, perhaps, is the notion of "opportunity cost" in economics, or even "price" as a product of the interaction of supply and demand rather than an inherent quality of a commodity (Entwistle, 2003). But you can see how critical it is; if you misunderstand "price" nothing else makes sense. Grasp it, and other things fall into place.
- Much less obvious to me, although Meyer and Land (2003) cite it as their initial example, is this culinary example:

Cooking is fundamentally a process of using heat (in various degrees and sources) to effect desired outcomes. In physics one encounters the concept of heat transfer and its mathematical formalisation (as an equation) that represents heat transfer as a function of something called the temperature gradient. It is not necessary to have a sophisticated understanding of physics to have this principle quite simply illustrated. Imagine that you have just poured two identical hot cups of tea (i.e. they are at the same temperature) and you have milk to add. You want to cool down one cup of tea as quickly as possible because you are in a hurry to drink it. You add the milk to the first cup immediately, wait a few minutes and then add an equal quantity of milk to the second cup. At this point which cup of tea will be cooler, and why? (The answer is the second cup, because in the initial stages of cooling it is hotter than the first cup with the milk in it and it therefore loses more heat because of the steeper temperature gradient.) When the physics of heat transfer is thus basically grasped by people in terms of things specific to what goes on in the kitchen, it will fundamentally alter how they perceive this aspect of cooking, and they might consequently even filter out what to look for (the signified!) when they watch the better class of television cookery programmes; for example, a focus on the pots and pans that are selected by the chef in context (the heat source in relation to the cooking process to be applied as a function of time and its regulation to the ingredients) rather than simply on the ingredients and, superficially, the 'method'. So it could be said that, as a stand-alone example, heat transfer or, more precisely, controlling the rate of heat transfer, is a threshold concept in cookery because it alters the way in which you think about cooking.

(Meyer and Land, 2003; 1)

- Like many threshold concepts, this one is not intuitive (hence "troublesome" in another sense), but perhaps the fact that I do not find it intuitive accounts in some measure for my failings as a cook! And despite the reference to the physical

equations about heat transfer, there is no suggestion that it has to be "understood" at that academic level.

The term, "threshold" also suggests another metaphor, of a doorway giving onto and revealing a room ahead. The "logo" Ray Land uses in his presentations is of a door opening onto light. And what it is giving onto is a new way of thinking and practising. This is not a once-and-for-all revelation or conversion experience of which we speak; it is simply one more step along the way to understanding a subject and acquiring a professional identity. I mention both "understanding" and "acquiring an identity" because Land and Meyer have identified that the transformation brought about by grasping a threshold concept is both epistemological (concerning the meaning of the subject) and ontological (concerning your view of your own being).

The change which occurs when "the penny drops", when a threshold concept is grasped, is irreversible. Once you have learned to read, you may stumble over odd words, but barring neurological damage, you will never again know what it is not to be able to read. Once you have learned how to balance and ride a bicycle, it is there for ever.

However, the knowledge base of a threshold concept, as alluded to, is not necessarily straightforward. Indeed, it is frequently experienced as "troublesome" (Perkins, 1999). This may be because of its sheer difficulty (as in some of the sciences), because of its emotional connotations (as in the case of "caring", and some of the areas explored in my own research), or because it runs counter to "common-sense" (the notion of price). That is why acquiring it is not just another step up a smooth slope or even a regular staircase; it does involve an extra effort to breast an intermediate summit. (The fell-walking analogy does break down in that it is possible to carry on climbing [i.e. studying the course] without ever having conquered that summit; but I do mean "studying the course", rather than learning effectively.) Some students even manage to graduate without ever having grasped some threshold concepts of their course; they are simply going through the motions. They never "think like..." an engineer, a designer, an accountant, a philosopher...

So the transition across the threshold is not likely to be easy. The theatrical version is rather too sanguine;

**Eliza:** The rain in Spain stays mainly in the plain.

**Higgins:** I think she's got it. I think she's got it.

**Eliza:** The rain in Spain stays mainly in the plain.

**Higgins:** By George, she's got it. By George, she's got it. Now once again, where does it rain?

**Eliza:** On the plain! On the plain!

**Higgins:** And where's that soggy plain?

**Eliza:** In Spain! In Spain!

**Chorus:** The rain in Spain stays mainly in the plain!...

Lerner and Loewe (1956) *My Fair Lady* (after G B Shaw, 1913)

Instead, it may well be characterised by uncertainty and trepidation and disorientation. We noted before that grasping a threshold concept has implications for one's sense of identity ("ontological" implications) as well for what one knows ("epistemological" implications). Thinking differently of oneself is not trivial. (Indeed, it could be argued that the drama of "Pygmalion"/"My Fair Lady" largely comes from Eliza's ambivalence about her "learning". From Higgins' viewpoint it's an unmitigated benefit, but for Eliza...?) Sometimes, the sheer difficulty of making the transition is enough to make people give up on their learning, and my own research has shown that the problem does not have to be about "big" or "profound" changes to have a profound impact (Atherton, 1991).

Land calls this uncertain, tentative, crossing of the threshold "liminal" (following Turner, 1969). That means "on the edge". Learners at this stage need personal, sensitive support which, whether tough or tender, helps them to make the transition and to consolidate and exploit it afterwards. He has much more to say about this, but we shall leave it there for the moment.

## So what?

- So: First, don't rely on this informal account of the ideas. It has been pitched just to familiarise you with some aspects of them. Follow the links and read the proper stuff!
- Second: Go in search of the threshold concepts in your discipline.
- Third: Think about how you can do them justice within your teaching programme, and how you can support learners grappling with them.
- Fourth: How might you focus on them, and how might you teach and assess them?

## References

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