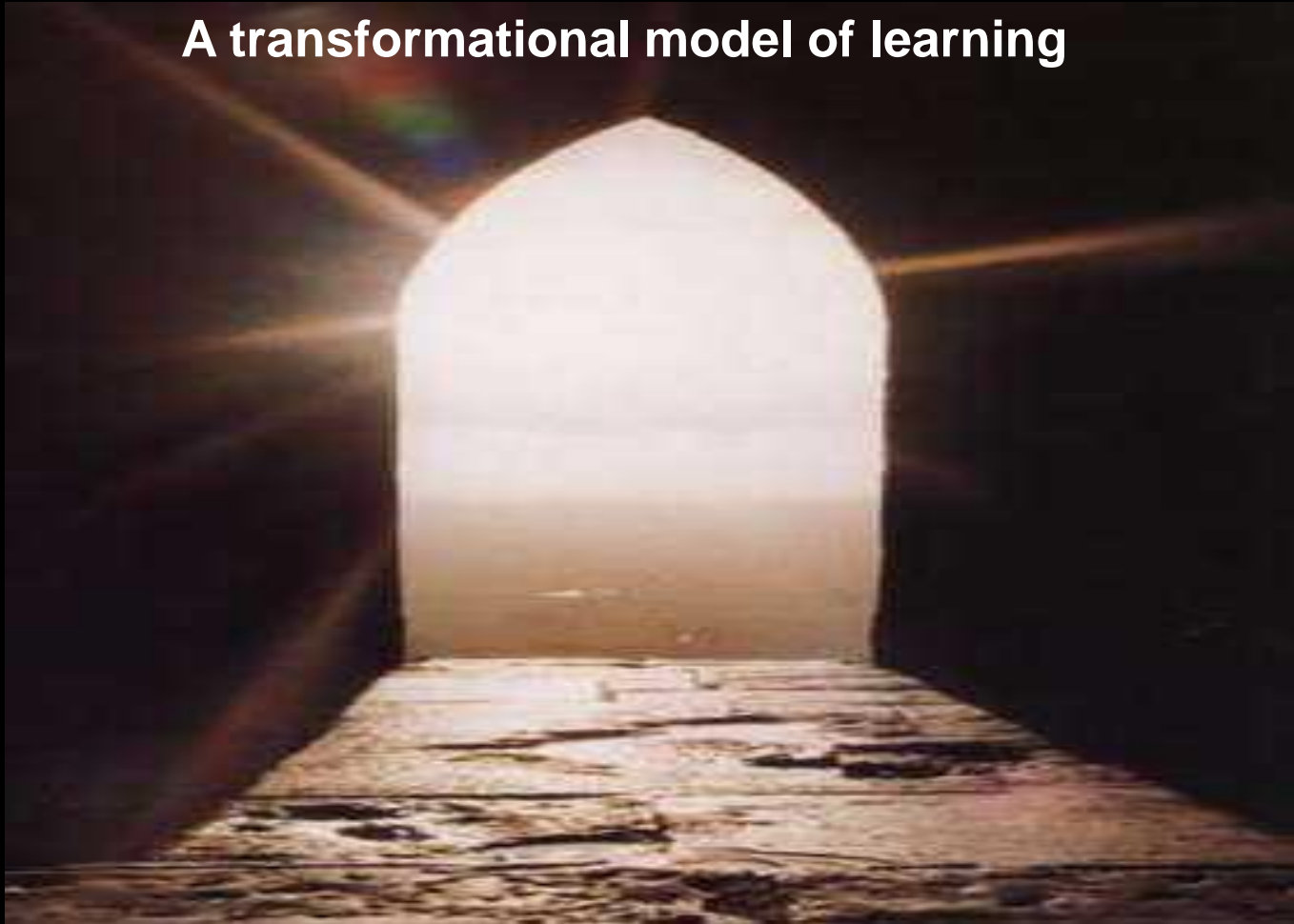



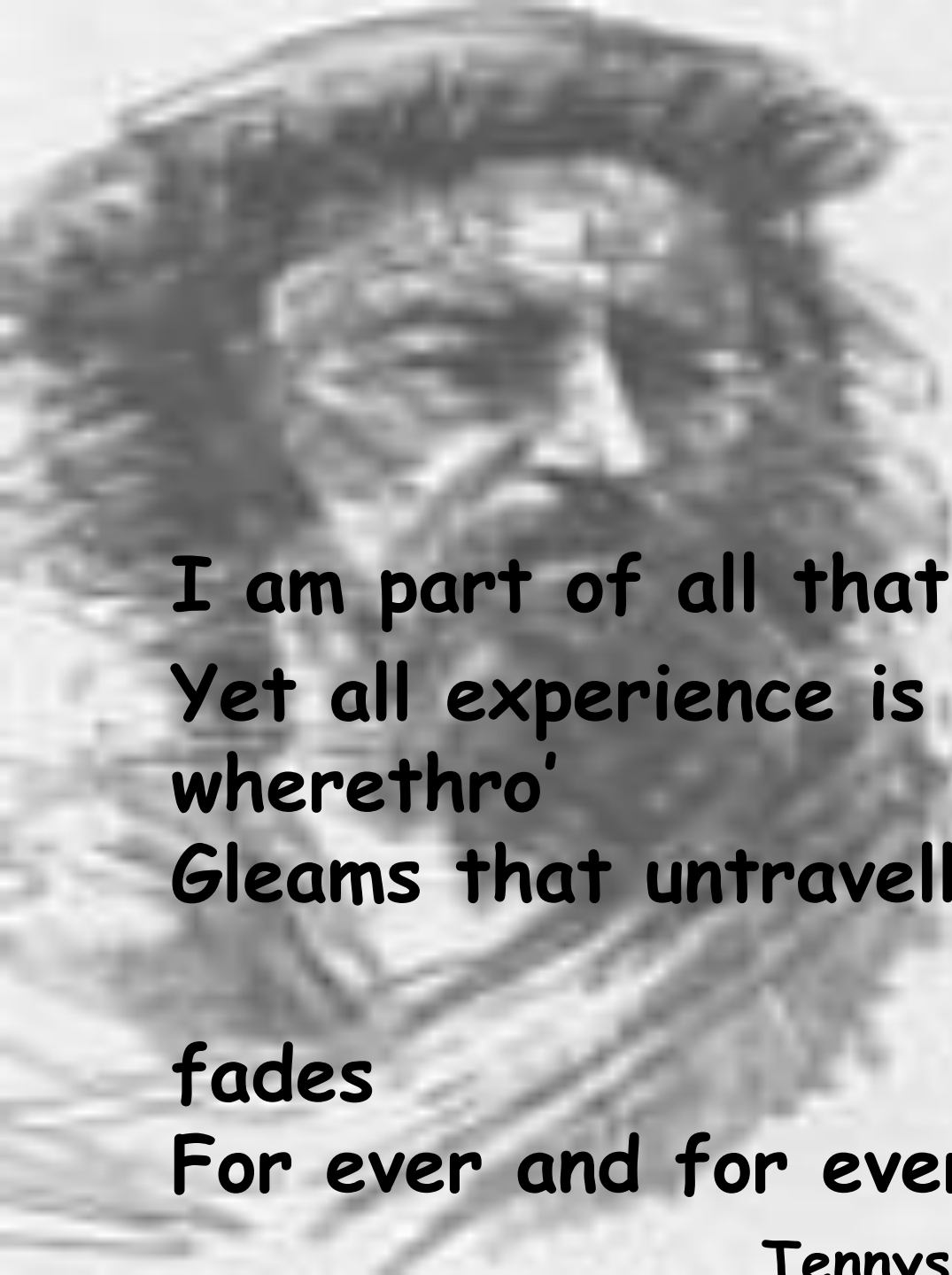
# Threshold Concepts and Troublesome Knowledge

A transformational model of learning



Ray Land, University of Strathclyde, Glasgow





I am part of all that I have met;  
Yet all experience is an arch  
wherethro'  
Gleams that untravell'd world,  
whose margin  
fades  
For ever and for ever when I move.

Tennyson 'Ulysses'

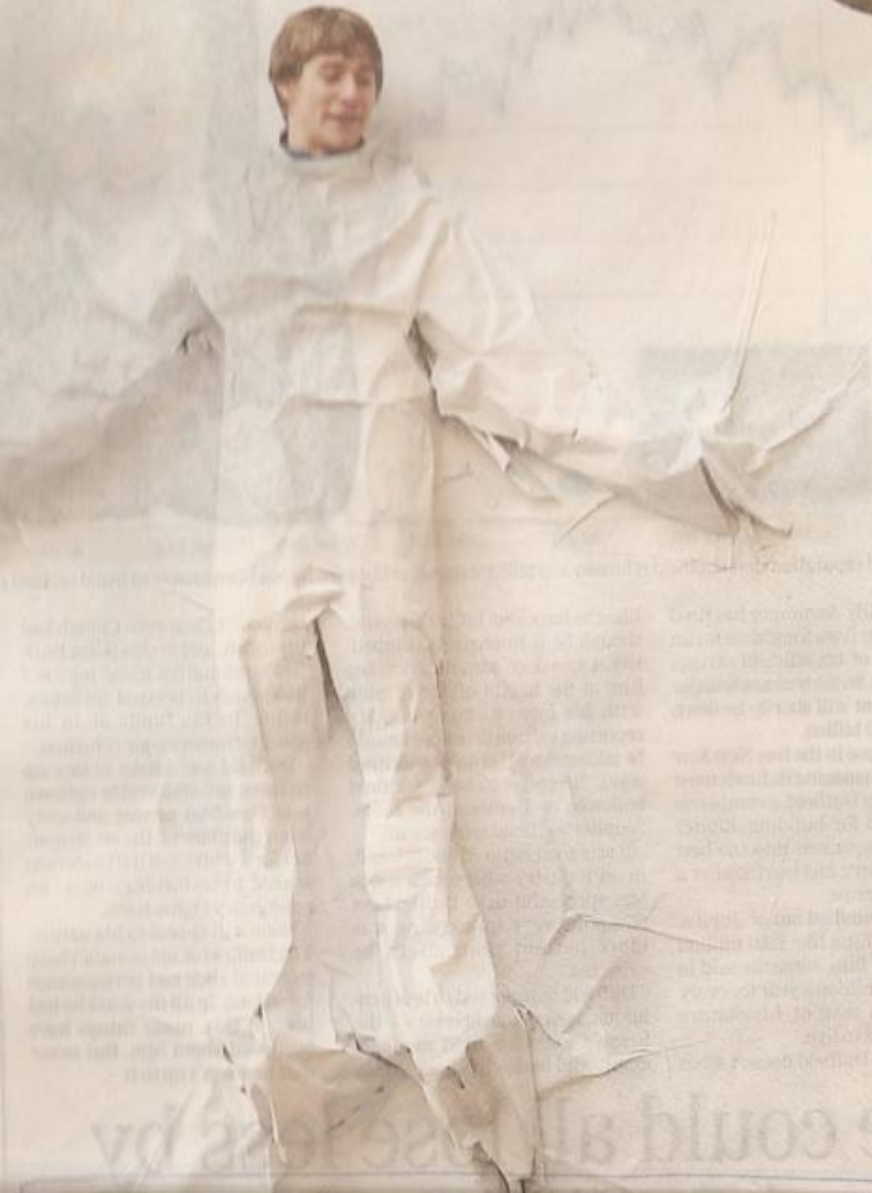
- **Threshold concepts**
- **Liminality**
- **Troublesome knowledge**
- **Episteme (the underlying game)**

Troublesome knowledge



# STUCK

## Causes of conceptual (or other) difficulty?



The role of the teacher is to arrange  
victories for the students

Quintilian 35-100 AD



The prevailing discourse of ‘outcomes’, ‘alignment’ and ‘achievement’ has, from critical perspectives, been deemed to serve managerialist imperatives without necessarily engaging discipline-based academics in significant reconceptualisation or review of their practice.

(cf. Newton, 2000).





Academics' own definitions of quality would seem to remain predominantly discipline-centred

(cf. Henkel, 2000:106).





Notion that within specific disciplines there exist significant 'threshold concepts', leading to new and previously inaccessible ways of thinking about something.

(Meyer and Land, 2003).



# ‘Concept?’



‘a unit of thought or element of knowledge  
that allows us to organize experience’

Janet Gail Donald (2001)

*‘Learning to Think: Disciplinary Perspectives’*



James Joyce's 'epiphany'  
— the 'revelation of the whatness of a thing'.

But threshold concepts are both more  
constructed and re-constitutive than revelatory,  
and not necessarily sudden.

(ευρηκα!)

# Threshold Concepts



Akin to a portal, a liminal space, opening up a new and previously inaccessible way of thinking about something.

Represents a transformed way of understanding, or interpreting, or viewing something without which the learner finds it difficult to progress, within the curriculum as formulated.

# Threshold Concepts



As a consequence of comprehending a threshold concept there may thus be a transformed internal view of subject matter, subject landscape, or even world view.

Such a transformed view or landscape may represent how people ‘think’ in a particular discipline, or how they perceive, apprehend, or experience particular phenomena within that discipline, or more generally.



**However the engagement by the learner with an unfamiliar knowledge terrain and the ensuing reconceptualisation may involve a reconstitution of, or shift within, the learner's subjectivity, and perhaps identity.**

**Ontological implications. Learning as 'a change in subjectivity'.**  
(Pelletier 2007).



# Liminality

- a transformative state that engages existing certainties and renders them problematic, and fluid
- a suspended state in which understanding can approximate to a kind of mimicry or lack of authenticity
- liminality as unsettling – sense of loss

# Janus – divinity of the threshold

epistemological




ontological

East of Eden

through the threshold



A dramatic, dark landscape painting. The scene is dominated by deep shadows and a glowing, golden light source on the horizon, creating a strong contrast. In the foreground, a small, pale figure stands on a rocky outcrop, looking out over a vast, dark expanse. The background features a large, dark, craggy rock formation on the right, and a distant, glowing horizon line that suggests a body of water or a distant land. The overall mood is somber and contemplative.

*Some natural tears they dropped, but wiped them soon;  
The world was all before them, where to choose  
Their place of rest, and Providence their guide.  
They, hand in hand, with wandering steps and slow,  
Through Eden took their solitary way.*

John Milton (*Paradise Lost*, Book XII; 1667)



# Examples



- Pure Maths – ‘complex number, a *limit*’, the Fourier transform’
- Literary Studies – ‘signification, deconstruction, ethical reading’
- Economics – ‘opportunity cost, price, elasticity’
- Design – ‘Confidence to challenge’
- Computer Science – ‘programming’, ‘Y and Recursion’
- Exercise Physiology – ‘metabolism’
- Law - ‘precedence’
- Accounting - ‘depreciation’
- Biology, Psychology - ‘evolution’
- Politics – ‘the state’
- Engineering – ‘reactive power’, ‘spin’
- History – ‘Asiatic Conceptions of Time’
- Comparative Religion– ‘Biblical texts as Literary Texts’
- Plant Science ‘Photoprotection’
- Health Science – ‘Care’
- Physics – ‘Gravity’
- Geology - ‘Geologic Time’

# Opportunity Cost



Opportunity cost in any particular choice is, of course, influenced by prior choices that have been made, but with respect to this choice itself, opportunity cost is *choice-influencing* rather than *choice-influenced*' Thus, if 'accepted' by the individual student as a valid way of interpreting the world, *it fundamentally changes their way of thinking about their own choices, as well as serving as a tool to interpret the choices made by others.* (Shanahan, 2002)

# Sampling Distribution



They view statistics as a branch of mathematics because it uses mathematical formulas, so they look at statistics through a mathematical lens. What they are missing is the statistical lens through which to view the world, allowing this world to make sense. The concept of sampling distribution is this statistical lens. My own experience discovering this lens was a revelation, akin to the experience I had when I put on my first pair of eyeglasses – suddenly everything was sharp and clear. (Kennedy, 1998 p.142)



## Characteristics of a threshold concept

- integrative
- transformative
- irreversible
- bounded
- re-constitutive
- discursive
- troublesome



# Provisional stabilities

(Saunders 2003)

Such examples are always situated within specific paradigms and cultural contexts. Hence they are always provisional and negotiable.

There is not one definitive and total conceptual understanding available, to which the tutor aims to bring the learner in due course. This would imply an objectivist position.

# Troublesome Knowledge

When troubles come they come not single spies, but in battalions

*(Hamlet Act 4 Sc 5 ll 83-84)*

# looking for trouble

- Knowledge is troublesome for a variety of reasons (Perkins 2006). It might be alien, inert, tacit, conceptually difficult, counter-intuitive, characterised by an inaccessible 'underlying game', or characterised by supercomplexity.
- such troublesomeness and disquietude is purposeful, as it is the provoker of change that cannot be assimilated, and hence is the instigator of new learning and new ontological possibility.



# Troublesome knowledge

- ritual knowledge
- inert knowledge
- conceptually difficult knowledge
- the defended learner
- alien knowledge
- tacit knowledge
- loaded knowledge
- troublesome language

# Episteme: 'the underlying game'

'...a system of ideas or way of understanding that allows us to establish knowledge. ..the importance of students understanding the structure of the disciplines they are studying. 'Ways of knowing' is another phrase in the same spirit. As used here, epistemes are manners of justifying, explaining, solving problems, conducting enquiries, and designing and validating various kinds of products or outcomes.' (Perkins 2006 p.42)

'knowledge practices' (Strathearn 2008)

# Double trouble: 'games of enquiry'

Concepts can prove difficult both in their categorical function and in the activity systems or 'games of enquiry' they support. Not only content concepts but the underlying epistemes of the disciplines make trouble for learners, with confusion about content concepts often reflecting confusion about the underlying epistemes.

(Perkins 2006 p.45)

# Intellectual uncertainty

‘Intellectual uncertainty is not necessarily or simply a negative experience, a dead-end sense of not knowing, or of indeterminacy. It is just as well an experience of something open, generative, exhilarating, (the trembling of what remains undecidable). I wish to suggest that ‘intellectual uncertainty’ is ..a crucial dimension of any teaching worthy of the name.’

(Royle 2003 : 52)



# Venturing into strange places

The student is perforce required to venture into new places, strange places, anxiety-provoking places . This is part of the point of higher education. If there was no anxiety, it is difficult to believe that we could be in the presence of a higher education.

(Barnett 2007: 147)



# Heidegger's dynamic of rupture

- Rupture
- Explicitness (condition)
- Response (defensiveness or reflection)



# Decoding the Disciplines

1. What is a bottleneck to learning in this class?
2. How does an expert do these things?
3. How can these tasks be explicitly modelled?
4. How will students practise these skills and get feedback?
5. What will motivate the students?
6. How well are students mastering these learning tasks?
7. How can the resulting knowledge about learning be shared?

(Middendorf, J. and Pace, D. 2004)

Ten

Considerations  
for Course Design

# 1 jewels in the curriculum

Threshold concepts can be used to define potentially powerful transformative points in the student's learning experience. In this sense they may be viewed as the 'jewels in the curriculum'.

# 2 importance of engagement

Existing literature regarding teachers who want students to develop genuine understanding of a difficult concept points to the need for **engagement** eg. They must ask students to

explain it

represent it in new ways

apply it in new situations

connect it to their lives

and NOT simply recall the concept in the form in which it was presented (Colby, et.al, 2003: p263)

# 3 listening for understanding

However, teaching for understanding needs to be preceded by **listening for understanding**.

We can't second guess where students are coming from or what their uncertainties are. It is difficult for teachers to gaze backwards across thresholds.

# 4

## reconstitution of self

Grasping a concept is never just a cognitive shift; it also involves a **repositioning of self** in relation to the subject. This means from the viewpoint of curriculum design that some attention has to be paid to the discomforts of troublesome knowledge

# 5

## recursiveness

The need for the learner to grasp threshold concepts in recursive movements means that they **cannot be tackled in a simplistic 'learning outcomes' model** where sentences like 'by the end of the course the learner will be able to....' undermine the complexities of the transformation a learner undergoes (**post-liminal variation**). Consideration of threshold concepts to some extent 'rattles the cage' of a linear, outcomes-based approach to curriculum design.

# 6

## tolerating uncertainty

Learners tend to discover that what is not clear initially often becomes clear over time. So there is a metacognitive issue for the student (self-regulation within the liminal state) and a need for the teacher to provide a **'holding environment'** (Winnicott 1960)

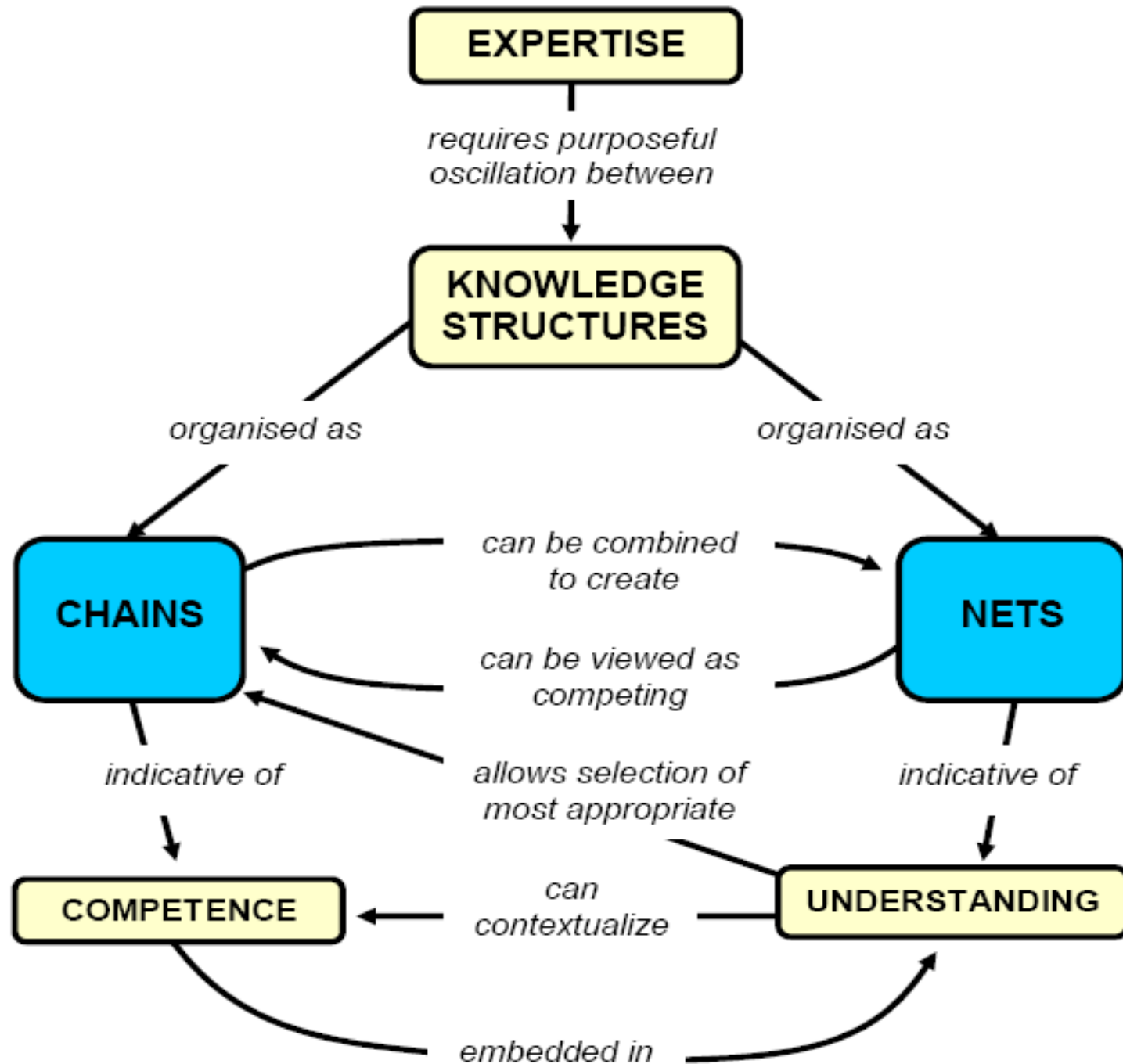
# 7

## Dynamics of Assessment



- Implies need to reconsider the nature of stimulus, protocol and signification in assessment practices
- Why do some students productively negotiate the liminal space and others find difficulty in doing so? Does such **variation** explain how the threshold will be, or can be, or can only be approached (or turned away from) as it 'comes into view'? And how does it 'come into view'?

- problem of signification of a particular understanding when the concept is outwith the domain of prior experience
- need to monitor progress by revealing thought processes that generally remain private and troublesome to the learner (Cohen, 1987).
- in traditional assessment, a student can produce the 'right' answer while retaining fundamental misconceptions (Marek, 1986).
- potential value of **concept mapping** to explore such variation (Kinchin and Hay 2006)



# pre-liminal variation

identifies variation in how the portal initially comes into view, how it is initially perceived or apprehended, and with what mindset it may therefore be approached or withdrawn from.

# liminal variation

how the portal, that is the liminal space itself, is entered, occupied, negotiated and made sense of, passed through or not.

# post-liminal variation

Variation in the point and state of exit into a new conceptual space, and the epistemological and ontological terrain encountered from that point onwards.

This mode constitutes *post-liminal variation* indicating the trajectory of the student's future learning and residual misconceptions and misunderstandings.

# sub-liminal variation

Variation in the extent of the learner's awareness and understanding of an underlying game or episteme – a 'way of knowing' – which may be a crucial determinant of progression (epistemological or ontological) within a conceptual domain.

Variation in such tacit understanding constitutes a mode of *sub-liminal* variation.

# 8

## contestability of generic 'good pedagogy'

There is emerging indicative evidence that the 'good pedagogy' of relating concepts to everyday phenomena, or simplifying them, can break down, eg depreciation, opportunity cost.

# 9

## the underlying game (sub-liminal variation)

The need to recognise the ‘games of enquiry we play’ (Perkins 2006). Disciplines are more than bundles of concepts. They have their own characteristic epistemes. Need for students to recognise the ‘underlying episteme’ or game and develop epistemic fluency.

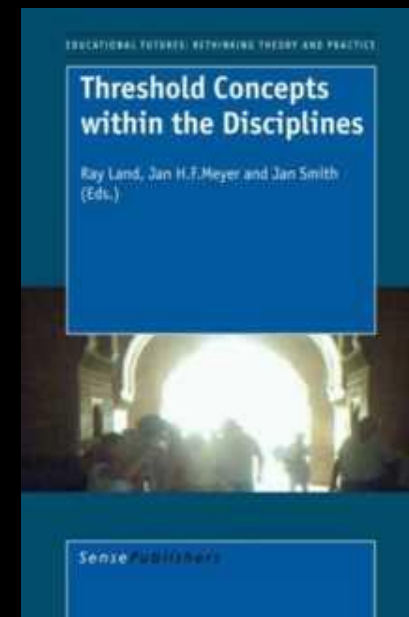
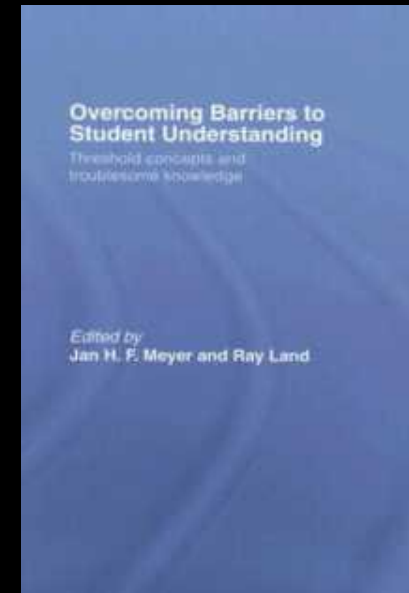
# 10

## professional development

Possibility of using thresholds framework to design more discipline-specific programmes of professional development.

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ray.land@strath.ac.uk

