

A toolkit for developing locally agreed threshold concepts in entrepreneurial thinking

Dave Jarman & Lucy Hatt

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Contents

Introduction	2
What threshold concepts are (and are not)	3
‘Threshold’ as opposed to ‘Important’ concepts	4
The CfIE process for identifying locally agreed threshold concepts.....	5
Lessons learned	8
Assume it will take longer than expected.	8
Language.	8
Be clear what you are doing, and not doing, when engaging colleagues in this kind of inquiry.....	8
Threshold concepts are likely to be interconnected.	9
Three different approaches to using this toolkit.....	10
The Short Approaches	10
The Medium Approach.....	12
The Long Approach	14
Ethics Approval.....	14
The Briefing	15
The Initial Longlist	15
From Longlist to Shortlist	16
Surveys vs Focus Groups	16
External Panels	17
Finalising the Shortlist into the Candidate Threshold Concepts	17
Thoughts on the process of Synthesis.....	18
Summary Report: Student Perceptions of CfIE Threshold Concepts.....	19
Concept Mapping	19
Method.....	19
The Results	20
References	22

Introduction

Our toolkit is for enterprise and entrepreneurship educators who:

- Want to help their students develop a better understanding of entrepreneurial thinking.
- Want to engage colleagues and stakeholders in discussion about what is taught, learnt, and assessed, and why.
- Want to build both consensus within an educator team and differentiation from other disciplines or domains of practice by aligning, rationalising, and demarcating what is meant by entrepreneurial thinking.

It is based on original practice-based research into synthesising locally agreed threshold concepts by Dave Jarman (University of Bristol, Centre for Innovation and Entrepreneurship) and Dr Lucy Hatt (Newcastle University Business School) at the Centre for Innovation and Entrepreneurship (CfIE) which in turn builds on Dr Lucy Hatt's doctoral research. The CfIE threshold concepts research was funded by Enterprise Educators UK (EEUK) as part of their Enterprise Education Research Development Fund (EERDF) in 2020-2021.

You could use this toolkit to explore threshold concepts in other domains of knowledge or practice, but we have focused on entrepreneurial thinking.

Why might locally-agreed threshold concepts for entrepreneurial thinking be of value and for who?

According to the QAA (2018, p. 7), enterprise is “the generation and application of ideas, which are set within practical situations during a project or undertaking”. They define entrepreneurship as “the application of enterprise behaviours, attributes and competencies into the creation of cultural, social or economic value.” There is, however, a general lack of consensus regarding what entrepreneurship education in higher education really means (Pittaway & Cope, 2007), what needs to be learnt, whether it can be learnt, where it is best learnt, how to learn it, and how to measure if it has been learnt. There is a concern that the emergence and growth in entrepreneurship education has been faster than educators' understanding of what should be taught, and how outcomes might be assessed (Neck & Corbett, 2018).

There appear to be three main themes evident in the literature when identifying the purpose and impact of entrepreneurship education. These are increasing the number and success of new ventures; enhancing the employability of graduates and increasing their value in the job market; and preparing students for an uncertain future. Arguably they are equally important, but all are difficult to measure and connect directly with any specific educational intervention. Disparate purposes of entrepreneurship education inhibit effective curricula development and a more conceptual approach is called for.

Identifying threshold concepts in entrepreneurship could be useful for entrepreneurship educators in several respects; to avoid an overstuffed curriculum; to unblock student learning and facilitate curriculum development; to find consensus on approach between colleagues, and to demarcate the discipline from adjacent domains.

Identifying some concepts as ‘threshold’ offers a way of differentiating between core learning goals which enable the learner to see things in a different way and other learning goals which, though important, do not have the same significantly enabling and transformative effect. This allows the educator to focus on the conceptual understandings that enable a fuller understanding of the subject, and foster integration of knowledge, avoiding an over-crowded curriculum.

Failure to understand, view or interpret a threshold concept will stop the progression of learning. The threshold concept framework addresses the kind of complicated learner transitions learners undergo (Cousin, 2008). Recognising threshold concepts and the different ways individual learners approach them will enable educators to make the curriculum more effective and efficient and to unlock learner progress.

The significance of the framework provided by threshold concepts lies in its explanatory potential to locate troublesome aspects of disciplinary knowledge within transitions across conceptual thresholds, and hence to assist teachers in identifying appropriate ways of modifying or redesigning curricula to enable their students to negotiate such transitions more successfully.

(Land, Cousin, Meyer, & Davies, 2006, p. 205)

As such, threshold concepts are particularly relevant to curricular educators teaching enterprise and entrepreneurship content both within dedicated programmes and modules or embedded in other units where entrepreneurial thinking is useful to understand and demonstrate. It should be stressed that not all those who teach enterprise and entrepreneurship sit within a business school, teach a dedicated unit, nor even identify as enterprise and entrepreneurship educators; nonetheless, we believe that there is great value to be gained by thinking about the threshold concepts of entrepreneurial thinking and embedding them in your teaching, learning, and assessment practice.

- Threshold Concepts might help a team of Business School academics rationalize a wealth of *important* concepts in a dense curriculum into a smaller set of *threshold* concepts which are embedded into programme design and help connect and distinguish specific modules or units and prevent both unhelpful repetition and dissonance.
- Threshold Concepts might help a History/Science/Engineering/Theatre academic identify, contextualize, and embed entrepreneurial thinking practices into their teaching that support impact-creation or value-creation activities for their students now or in the future without having to negotiate a wider body of entrepreneurship content.
- Threshold Concepts might help diverse curricular and extra-curricular staff teams supporting student entrepreneurs find common ground and adopt a shared language, and also demarcate where and with who (and at what stage of a process) each is working.
- Threshold Concepts might help entrepreneurship educators engage both their students and important external stakeholders in a collaborative discussion about what it means to think entrepreneurially and build credibility with both camps.

What threshold concepts are (and are not)

The threshold concept framework posits that in any academic discipline there are concepts that have a particularly transformative effect on student learning. Termed threshold concepts, they represent a *transformed* way of understanding something, without which the learner cannot progress (Meyer & Land, 2005). In transforming the learner, threshold concepts change the learner's perceptions, subjectivity, and worldview. This can often be uncomfortable and is therefore sometimes resisted. Mastery of a threshold concept simultaneously changes an individual's idea of what they know and who they are (Cousin, 2009). Such conceptual understanding is likely to be irreversible and is unlikely to be forgotten or unlearned. Threshold concepts are also characterised by their integrative nature in that they expose how other things can be related to each other.

Defining the threshold concepts in any subject discipline is likely to inform the development of the curriculum in order that it might be optimized. Threshold concepts are concepts that bind a subject

together, being fundamental to ways of thinking and practising in that discipline (Meyer & Land, 2003, 2005). The concepts that are critical to thinking as an entrepreneur, and consequently to entrepreneurship, may be termed entrepreneurial thinking threshold concepts (Meyer & Land, 2003, 2005). Using the threshold concept framework (Meyer & Land, 2003) to define entrepreneurial thinking presents an important opportunity both in terms of the credibility of the subject area, and the design and delivery of enterprise and entrepreneurship curricula in higher education.

The use of the term ‘candidate threshold concept’ started to appear from 2008 (Osmond, Turner, & Land, 2008; Shanahan, Foster, & Meyer, 2008; Zander et al., 2008) and it is intended to use the term here to communicate a sense of fluidity and openness to the potential evolution of these concepts in entrepreneurial thinking in context (Hatt, 2020). Candidate threshold concepts (CTCs) in entrepreneurial thinking will be offered as starting points for discussion, selection and further consideration, not as absolute fixed definitions.

We are also treating the threshold concepts in entrepreneurial thinking as socially constructed. We are looking to shine a light on a phenomenon (entrepreneurial thinking) as it is seen and interpreted socially, in a world characterised by multiple views of reality, as it is construed by whoever is looking at it. This suggests the possibility that threshold concepts in entrepreneurial thinking might be context dependent and temporal. That is why we are not attempting to offer a definitive list but invite you to consider developing your own situated set of threshold concepts in entrepreneurial thinking, meaningful for you at a particular time and in a particular place.

‘Threshold’ as opposed to ‘Important’ concepts

As described above, threshold concepts are both *transformational* in aspect and *fundamentally distinctive* to the subject under discussion. Throughout the CfIE research process we discussed a much bigger range of potential concepts which were ultimately either incorporated as major or minor elements of the final set or removed because they did not meet the transformational or distinctive standard.

One of the other defining characteristics of threshold concepts is that they are bounded. A threshold concept will likely delineate a particular conceptual space and serve a specific and limited purpose. We are particularly interested in this characteristic, as it allows us to distinguish entrepreneurial thinking, and stops it getting mixed up with other important areas such as employability and gradueness.

For example, concepts such as *financial acumen* are indisputably important but not regarded as transformational. Concepts like *teamwork* are likewise important but were subsumed (in the CfIE threshold concepts) into both ‘Your Context is Your Opportunity’ and ‘Taking Action’ from the purview of connecting and engaging with diverse (human) resources to spot and act on opportunities which felt more distinctive to entrepreneurial thinking.

Ideas such as *responsible innovation* and *moving from extractive to sustainable and regenerative practices* were also highlighted by CfIE colleagues as highly desirable practice and potentially transformative for an individual but not necessarily transformative in establishing entrepreneurial thinking. Nonetheless these might be adopted into curriculum for the purposes of working towards a motivating and/or differentiating mission for an educator team.

It is also worth mentioning that we feel threshold concepts in entrepreneurial thinking come as a cluster or web, they are interdependent. Each one needs all the others to make sense.

The CfIE process for identifying locally agreed threshold concepts

Our research method was planned in the summer of 2020 and initially set out as below and in Figure 1 below; this was modified as the process progressed. The 20/21 academic year was heavily impacted by the COVID-19 pandemic and lockdown responses so almost everything was conducted remotely.

Planned Timescale	Real Events
1. CfIE Briefing Document (Appendix A) and survey sent out to CfIE staff (mid Oct)	<ul style="list-style-type: none"> The Briefing took place on 20th October 2020 with 17 academic colleagues invited and 14 present. Survey A (Collected Surveys, Appendix B) was opened on the 20th, initially for 10 days until 30th Oct but we held it open until 4th Nov to get more submissions. We had 7 responses.
2. First draft of CfIE TC's developed	<ul style="list-style-type: none"> We met online and used Mural to collate survey responses visually and distil a long list of potential concepts for use in the next stage. https://app.mural.co/t/davejarman0176/m/year34507/1604482216953/cb003a84783f5b572a5b9735ece7fd4126397da0?sender=davejarman9651 CfIE Entrepreneurship Concepts List #1 (Appendix C) was developed.
3. Group split (A and B1 & B2) and individual feedback on first draft collected from Group A. Focus groups held with B1 and B2 followed by collection of individual feedback on first draft (early Nov).	<ul style="list-style-type: none"> Focus Group took place on November 25th with 7 colleagues present having read CfIE Entrepreneurship Concepts List #1. We also circulated Survey B (Collected Surveys, Appendix B) between the 19th and 27th November along with a link to CfIE Entrepreneurship Concepts List #1, although this deadline was again extended to 30th November to get a few more submissions. We received 2 submissions on top of the 7 present at the focus group.
4. Second draft developed from CfIE feedback	<ul style="list-style-type: none"> The survey and focus group responses were synthesized using Mural (see Figure 2) during December 2020 and January 2021.
5. Individual feedback sought on second draft (Mid Nov)	<ul style="list-style-type: none"> This stage was culled due to time pressures on both the researchers and the research participants.
6. Third draft developed from CfIE feedback (early Dec)	<ul style="list-style-type: none"> This stage was culled due to time pressures on both the researchers and the research participants.
7. External stakeholders surveyed and responses collected (early Dec)	<ul style="list-style-type: none"> Survey C (Collected Surveys, Appendix B) was sent to a selected group of entrepreneurs and entrepreneurial support professionals

	between the 4 th and 19 th February 2021. 8 responses were collected.
8. External stakeholder contribution + Candidate Entrepreneurship Threshold Concepts developed by Dr Hatt circulated to CfIE with third draft for feedback (mid-January)	<ul style="list-style-type: none"> In reality we circulated Survey D (the staff-facing version of Survey C, <i>Collected Surveys, Appendix B</i>) to CfIE colleagues in parallel with the external group research between the 3rd and 12th February 2021.
9. Fourth draft developed incorporating CfIE feedback considering external inputs (Early Feb)	<ul style="list-style-type: none"> The responses from both Survey C (external) and Survey D (3rd round of internal) were synthesized and used to iterate and revise the 7 concepts that had emerged.
10. Fourth draft circulated for final approval to CfIE team (early March)	<ul style="list-style-type: none"> Whilst the 7 concepts were largely finalized in March 2021 they were not shared with colleagues until July 2021 due to a Strategic Review of the CfIE.
11. Concept mapping workshops held with students (May)	<ul style="list-style-type: none"> These were conducted on the 15th and 17th June 2021
12. Produce CfIE Candidate Threshold Concepts	<ul style="list-style-type: none"> See CfIE versions with and without theory: <i>Appendix E and F</i>

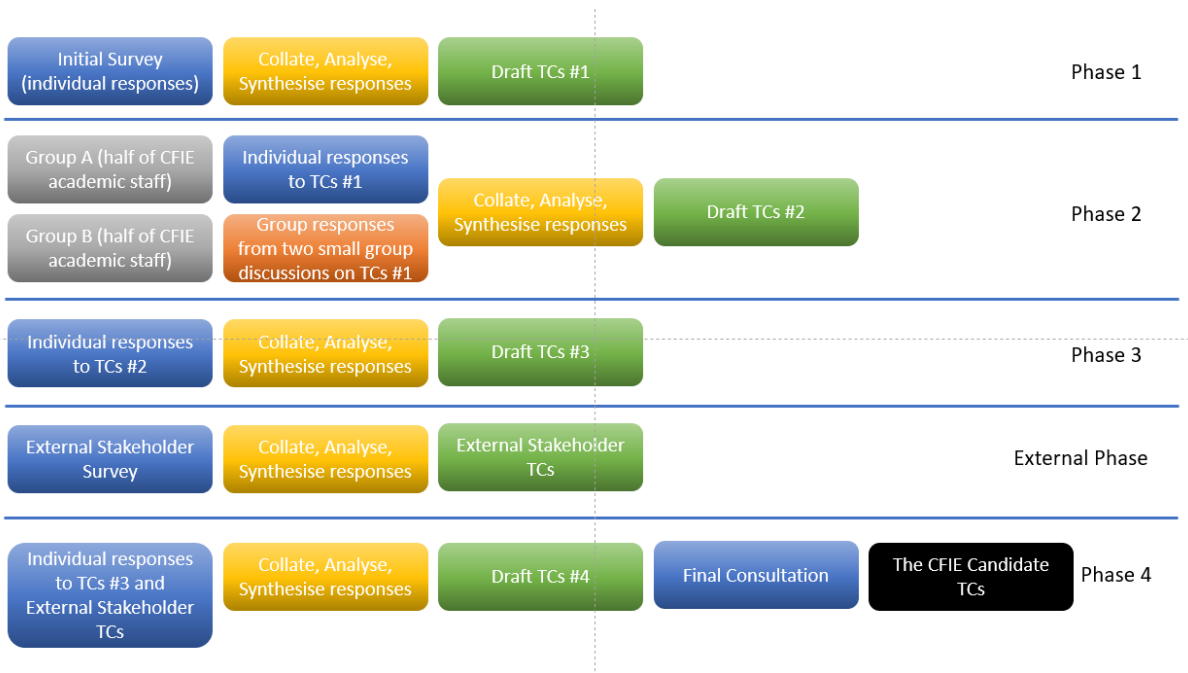


Figure 1 Original Outline of Phases



Figure 2 Second Draft Synthesis

Lessons learned

Assume it will take longer than expected.

We were somewhat sabotaged by the workload CfIE colleagues were under in the wake of the COVID-19 pandemic in late 2020 and early 2021. In a team of largely teaching-focused colleagues we were all under considerable pressure to move previously in-person teaching online, often on a week-by-week basis, and both the researchers and the participants found it hard to make the time for what felt like a somewhat philosophical research inquiry. Despite colleagues' professed interest in the project they frequently struggled to respond in a timely fashion to surveys and we extended deadlines on multiple occasions. The researchers similarly struggled to find time to produce the synthesis.

This was, in the end, no bad thing. The research went on throughout a somewhat stressful year, was a regular point of discussion with colleagues, and was likely richer for processing alongside a Strategic Review that questioned our role in the University, how we sat with an emerging Business School, and how best to deliver a transformative curriculum online.

Language.

The CfIE teaching team is a mix of disciplines; within the 'entrepreneurship' group we have serial entrepreneurs, ex-corporate innovation professionals, business advisors, and career academics; within the 'design thinking' group we have service design consultants, hardware developers, interaction designers, graphic communications specialists, and sustainable fashion entrepreneurs... initially a lot of the design thinking colleagues did not feel like they could or should contribute:

"Morning... I've tried to complete your survey and I can't do it. I don't teach entrepreneurship and I have problems with the [word] 'entrepreneur' so I can't give you anything valuable. I'm Sorry."

This was a not untypical first response. We compounded the problem with the first question on the first survey which asked for a 'favourite definition of entrepreneurship', which rather assumed they had more than one to pick from and readily identified with entrepreneurship. Further questions again rather assumed the participant was happy with the idea they were delivering entrepreneurial education, which was not true in all instances. This led to the *CfIE TCs – Language (Appendix D)* document which was used both in a succession of later emails to colleagues to invite them back into the process – and as the basis for several in-person and online conversations with colleagues to explain what we were trying to do. Ultimately it led to moving away from 'Entrepreneurship' in favour of 'Entrepreneurial Thinking'.

Be clear what you are doing, and not doing, when engaging colleagues in this kind of inquiry.

In addition to the perils of language, we had several instances of colleagues assuming we were in fact strategizing about the CfIE's overall vision and mission and getting over-excited or vexed that this process did not seem to account for their own particular agenda items in the CfIE's direction of travel.

Obviously, by researching and discussing such fundamental ideas as threshold concepts, you will end up in territory very close the *purpose* of your team, centre, or school. Just be clear what its likely outputs will be (and will not be) and be ready to suggest alternate mechanisms for other agendas.

Threshold concepts are likely to be interconnected.

Our resulting threshold concepts clearly work best when understood as a cluster or linked set of related concepts with a degree of interdependency. They did not all work by themselves, or certainly when taken alone did not seem exclusive to entrepreneurial thinking.

Three different approaches to using this toolkit.

Not every team will have the time, will, and resource to follow the whole process used by the Centre for Innovation and Entrepreneurship (CfIE) at the University of Bristol, although some may even want to go further. To that end we have developed three variants which would allow individuals and teams to use the broad ambitions of this work within their own constraints.

- **Short:** use the CfIE threshold concepts to spark discussion about or conduct a review of your existing teaching, learning, and assessment.
- **Medium:** run a facilitated activity with colleagues and stakeholders to identify and verify a preliminary set of locally agreed threshold concepts. We provide a card-sort activity to structure this session.
- **Long:** run something akin to the CfIE Collaborative, Co-created Curriculum Inquiry model in which several rounds of surveys and focus groups gradually refine a set of locally agreed threshold concepts.

The Short Approaches

#1 Our tool for provoking discussion about what is a threshold concept in entrepreneurial thinking helps entrepreneurship educators who want to both align their colleagues and demarcate their discipline by suggesting transformative threshold concepts around which to align and agree a consensual focus.

For this approach you need:

- Our list of *CfIE Threshold Concepts in Entrepreneurial Thinking*, either with academic theory (*CfIE TCs – In Theory, Appendix E*), or without (*CfIE TCs, Appendix F*), depending on your audience.
- A formal (ideally) opportunity for sharing these concepts with teaching colleagues and time to discuss them.

This process can be as quick or long as you desire; from a very short introduction or provocation to go and read them through, to a longer process of discussion and review in which colleagues each undertake some version of approach #2 below.

In any discussion of these threshold concepts a few key principles are worth explaining that help focus and contain discussion:

- Explain that the CfIE examples are specifically about ‘Entrepreneurial Thinking’ and not ‘Entrepreneurship’ or ‘Business Management’ or any other adjacent territory.
- Explain what threshold concepts are (and are not) – see this section in the Introduction to help differentiate between ‘important’ and ‘desirable’ and ‘threshold’ concepts.
- Be clear about what a successful outcome to your intervention looks like, i.e. are you simply providing interesting reading, are you seeking support or engagement in a review, or something else?

Once you have framed the discussion, we would recommend sharing the CfIE list and instigating discussion with some of these sample questions:

- Which of the CfIE concepts can you readily agree with as threshold and why?
- Which of the CfIE concepts are you not sure about as threshold and why?

- Which threshold concepts in entrepreneurial thinking do you think are missing from the CfIE set?
- Would a student achieving your programme/unit/module ILOs (Intended learning outcomes) also be demonstrating that they ‘get’ one or more of the CfIE threshold concepts?
- Does your programme’s taught content and/or learning activities enable students to understand the significance of the threshold concepts through personal experience?
- Do your programme assessments enable you to judge whether a student has demonstrated that they ‘get’ one or more threshold concepts?

#2 Our tool for conducting a curriculum review helps entrepreneurship educators who want to enhance their entrepreneurship teaching, learning, and assessment design by focusing on what is truly transformative and enabling a decluttering of less impactful content.

In this approach you need:

- Our list of *CfIE Threshold Concepts in Entrepreneurial Thinking*, either with academic theory (*CfIE TCs – In Theory, Appendix E*), or without (*CfIE TCs, Appendix F*), depending on your audience.
- A summary of your unit, module, or programme’s:
 - Intended Learning Outcomes
 - Taught Content and Learning Activities summary
 - Assessment Plan

This process can be as quick or long as you desire. Taking the CfIE concepts ‘in practice’ and using the exemplars of students who ‘get’ the concept as a benchmark, review:

- Would a student achieving your ILOs also be demonstrating that they ‘get’ one or more of the threshold concepts?
- Does your taught content and/or learning activities enable students to understand the significance of the threshold concepts through personal experience?
- Do your assessments enable you to judge whether a student has demonstrated that they ‘get’ one or more threshold concepts?

The Medium Approach

#3 Our facilitated activity for developing a rough set of locally agreed threshold concepts for entrepreneurial thinking helps entrepreneurship educator teams identify and focus on what is transformative in their curriculum and helps them align around a common approach that can produce greater impact.

In this approach you need:

- One or more physical (and cut up) copies of the *Threshold Concepts in Entrepreneurial Thinking Card Game*, ideally one per group of 2-4 participants, or access to the equivalent online Mural site.
- Some blank cards (at least 20 per group) and pens if using the physical version.
- A whiteboard or a further blank Mural board on which to collect the shortlisted candidate concepts.
- At least 60 minutes of your colleagues' collective time.

The 'cut out and keep' paper version of the card game is provided amongst the Toolkit documents and the Mural Template for the exercise is linked here: <https://app.mural.co/template/234e7ab1-0e39-4754-b0ac-ac4d9d2587b1/0d3aad0d-aab5-44e3-90eb-50b9a09358f4>

Instructions for use

Stage 1

As a group make sure you are familiar with what is meant by a threshold concept. Explanations are provided on Page 3 and Page 4 above and at the top of the Mural template.

Use the Initial Concepts in Entrepreneurial Thinking provided (either as cards or on the Mural) and start adding them to the three distinct piles or demarked areas visible to the group marked 'Likely to be threshold concepts', 'Possibly threshold concepts', and 'Unlikely to be threshold concepts'. Stress that these need not be definitive allocations at this stage.

Add further cards or notes to add whatever you think is missing from the initial selection provided.

This stage can be done quickly (<10 minutes) but we would recommend at least 20 minutes to have a good discussion and to understand colleagues' differing perspectives.

Stage 2

You are likely to already have run into several areas in the allocation in Stage 1 where you wanted to add some nuance or make connections between the Initial Concepts.

In Stage 2 we want you to really dig into that discussion:

- do some concepts only reach threshold status in certain circumstances? (i.e. collaboration is only a threshold concept in the context of acquiring resource to exploit an opportunity?)
- do some concepts only reach threshold status in connection with other concepts? (i.e. does failing only achieve threshold status when connected to self-awareness or adapting to context?)
- do some concepts readily cluster to create more transformative 'constellations' which suggest a threshold cluster?

Use further notes to add nuance, to name the connections you make, and to name emerging clusters. If these are on coloured paper or written in a new colour marker this can be helpful.

Some concepts may move between the Likely, Possibly, and Unlikely frames at this stage or by virtue of becoming nuanced, connected, or clustered. This is expected and encouraged.

This stage is best done over at least 20 minutes to really give people a chance to add detail, discuss examples of practice, and debate the terms.

Stage 3

Once each group has identified a series of Likely threshold concepts in entrepreneurial thinking you should encourage each group to 'show and tell' a number of those concepts. How many concepts you ask each to share and at what length depends on how many groups you have and how much time you have; and maybe on how talkative your colleagues are when presenting their ideas...

You should try to collect up and write down these shortlisted concepts for all the groups to see in one place. This might be on a whiteboard or flipchart easel or added to an electronic document or Mural that everyone can see on a screen. One reason to use another Mural is to make use of the 'Voting Session' function on the upper grey bar for the creator of the Mural. You can then allocate votes to participants and enable a voting round. If you are using a physical format, we would recommend the use of 'dot-voting' in which all participants are given a small number of sticky dots (usually 3-5 per person) to allocate and stick to the shortlisted concepts.

A vote helps to further shortlist the concepts. It is difficult to get further than this in a short session as it becomes increasingly fraught with pedantic discussions about specific wording; we'd recommend a small task group pick up the job from here, synthesising the most voted for concepts into a single list.

The Long Approach

#4 Our model for a collaborative co-created curriculum inquiry (3CI) for identifying threshold concepts for entrepreneurial thinking helps entrepreneurship educator teams identify a robust set of concepts which in turn enable a rationalised and transformative curriculum, an aligned team, and establishes clear demarcation between entrepreneurial thinking and other type of thinking.

This is the model we used at the CfIE as described in the *Toolkit Introduction*. In practice we ran one less phase than we had planned to, but you could choose to further shorten or extend the process as you see fit.

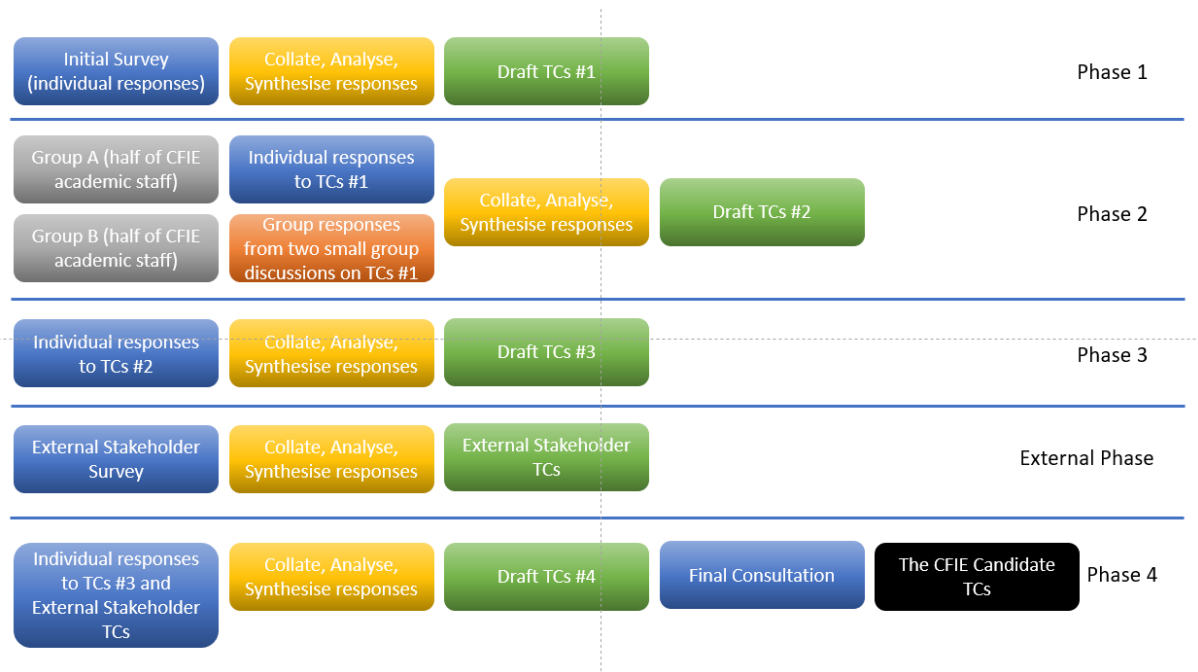


Figure 3 Planned CfIE research approach

What is important is that there is at least:

1. An initial process for gathering a long list of concepts
2. A stage in which that long-list is reviewed, evaluated, and distilled into a short-list
3. A stage in which that short-list is reviewed and finessed
4. A final stage in which the candidate concept list is agreed upon and action taken to implement.

What is optional is:

- Just how many stages of reviewing and finessing of the short-list is conducted.
- Whether to include any consultation of external stakeholders.
- What form each stage takes – i.e. individual surveys vs focus group discussions.

Ethics Approval

If you are going down this route and conducting formal research activities with colleagues, you will almost certainly need ethical approval for your research.

No part of the process is particularly sensitive about its ethical implications, so it is not onerous to get approval. The most difficult bit was the specific permission for the student concept mapping

research because of the student-staff member relationship; Dave was not just a researcher but assessing their work elsewhere at the time.

The ethics form that was approved for our research is available as *Appendix G TCs Ethics Application*.

The Briefing

The initial briefing must deliver on several critical aspects of the research process:

- It introduces what threshold concepts are (and are not).
- It introduces what your process is trying to achieve in terms of desired outputs (and manages expectations with colleagues).
- It introduces the various steps and stages of the process, highlighting that it has multiple stages for participant contribution
- It sets out some of the Ethics process' Participant Information.

Our *CfIE Briefing Document (Appendix A)* is provided for you to refer to.

We made a point of sending this out ahead of an already-scheduled whole teaching team meeting in which we had put almost the whole of that hour-long meeting aside to discuss this research project.

In the meeting itself we provided a quick recap of the briefing document for those colleagues who had not yet read it, and then we turned it over to questions as quickly as we could.

Be ready for questions such as:

- What are threshold concepts (and how are they different to non-threshold concepts, principles, competencies, and so on)?
- Why just 'entrepreneurial thinking'?
- What are you going to do with these threshold concepts once we have them?

After the briefing we released the first stage of the research, in our case a survey.

The Initial Longlist

The first step of the research is to develop a longlist of potential threshold concepts. In this step you need to ask several open questions to elicit a range of potential responses.

We would recommend asking some or all the following questions:

- **What do you consider to be fundamental to a grasp of entrepreneurial thinking?**
- **What are your main objectives when delivering entrepreneurship education?**
- **When you are delivering entrepreneurship education, and aiming to develop entrepreneurial thinking in particular, what do students find difficult to grasp? What don't they "get"?**
- **When students start to "get" entrepreneurial thinking, how do you know? How can you tell?**
- **When you are delivering entrepreneurship education, and aiming to develop entrepreneurial thinking in particular, what do you find hard to teach/ get across?**

Once you have these responses you can sift out all the specific concepts presented. This may require some synthesis and interpretation, but it is important to remember that this is a longlist at this stage and colleagues will get more opportunities to clarify and correct any misinterpretation of their earlier remarks.

We chose to compile a long list of headline terms (to aid quick reading) each accompanied by a very short single-sentence explanation (for clarification). Our example *CfIE Entrepreneurship Concepts #1* is provided as *Appendix C*.

From Longlist to Shortlist

Subsequent stages of research focus on distilling down that long-list into a shortlist through one or more rounds of further contribution which add nuance and tend to cluster groups of 'smaller' concepts into broader concepts that are likely to be more transformational.

Subsequent stages typically involve providing participants with a synthesis of the previous round of contributions and then asking them the following (or similar) questions:

- **Having reviewed the list circulated, please identify which of the concepts you would suggest are **threshold concepts** and **distinctive** to entrepreneurial thinking and why? There is no limit on the number of concepts you can select.**
- **Having reviewed the list circulated, please identify which of the concepts you would suggest are *threshold concepts* and **in combination distinctive** to entrepreneurial thinking and why? There is no limit on the number of concepts you can select. (It may be that by themselves the concepts are not distinctive to entrepreneurial thinking, but taken together, or given a specific context they might be.)**
- **Please identify any further candidate Entrepreneurial Thinking Threshold Concepts which you believe are missing from our list.**

Each stage of distilling helped us see where colleagues were consistently forming clusters, consistently highlighting specific concepts as being likely to be threshold concepts, and discarding concepts as being unlikely to be threshold concepts. The process of synthesising can be a challenging one, please see our thoughts on this below.

Examples of our Surveys to staff and externals are provided as *Collected Surveys as Appendix B*.

Surveys vs Focus Groups

Different methods of engaging participants produce different types of response. Surveys enable individual responses which can produce more diversity of response and less groupthink, Focus groups enable colleagues to discuss and debate ideas, often reaching conclusions and insights they would not have reached independently, and enabling greater alignment in the group

The initial long-listing benefitted from an individual survey format to get a wide diversity of voices and contributions, which then proved useful in offering provocations to other colleagues in subsequent phases. Had we started with an initial focus group this might have produced a more limited list, albeit more consensually agreed-upon. The initial part of this process should be a divergent one because it is harder to add divergence later whilst the process naturally converges.

In the subsequent phases we did use one focus group (whilst also offering an individual survey route for those who could not attend) which was really productive as, as researchers, we could hear the thought processes by which contributions coalesced which was somewhat missing in the surveys. It was easier to detect nuances, dependencies, and contextualisations that were useful in the eventual process of synthesis.

The focus group method can also be useful for engaging colleagues more actively in the process, for building a sense of ownership and good-feeling, and for doing some of the work of building understanding and consensus around the concepts.

External Panels

We also included a survey round with a panel of external experts who reviewed a late-stage synthesis of the emerging threshold concepts.

We would recommend this for a variety of reasons:

- Providing some potentially divergent input from experts but not educators, who might see the subject afresh and challenge the emerging concepts.
- Providing some credible (in)validation for the emerging concepts, from an external source.
- As a means to engage key external stakeholders in the pedagogic approach of the team; this can help build a sense of partnership, can burnish egos with having been asked for expertise, and for kick-starting or re-igniting conversations that might lead to future collaborations.

Our experts were sourced from:

- Alumni of the University now working as or adjacent to entrepreneurial start-ups.
- Entrepreneurs; ranging from relatively new but established start-up founders, to mid-career, and late-career entrepreneurs.
- Entrepreneurial support professionals: ranging from investors, to mentors, to scale-up support specialists, some of whom also had experience as entrepreneurs, but not exclusively. They did all work on a near-daily basis with entrepreneurs.

We would recommend involving them at the later stages as they are often time-poor and need something relatively succinct to review and feed back on, rather than a sprawling long-list.

They will need careful briefing, and the idea of ‘threshold concepts’ can be quite academic and abstract to some of them, but most of ours quite quickly grasped the idea of ‘irreversible learning’ and ‘rites of passage’ in the understanding of how to think entrepreneurially. We found it important to focus on the idea that we were using these concepts to frame opportunities to learn through experience, as several of them initially pushed back against the idea that these kinds of transformative concepts could be ‘taught’ (i.e. instructed).

We found that the external experts gave us both provocations to use when challenging our colleagues on their emerging threshold concepts and a range of good examples and turns of phrase when articulating our final candidate threshold concepts.

Finalising the Shortlist into the Candidate Threshold Concepts

Eventually you will need to finalise your list of Candidate Threshold Concepts; those which will become your locally agreed set.

We would suggest the following formulation:

- A ‘Headline’ phrase (e.g. Iterative Experimentation)
- An explanation of what that means *in practice*; ideally around 1-2 paragraphs which explain how practitioners demonstrate their understanding (e.g. Embracing small failures as a means of maximising opportunities to learn from mistakes as well as success... It involves having a flexible and adaptable approach – practitioners are quick to change direction when feedback indicates that is what is needed.)
- An explanation of relevant academic models, theories, and sources of evidence that would seem to validate the significance of the proposed threshold concept (e.g. Many established entrepreneurial methods and practices embrace iterative development (Ries, 2011: Lean Start-up, IDEO: Design Thinking, and Takeuchi & Nonaka, 1986; Agile for example) and

highlight the value of ‘fast failure’ as a means of learning through small iterative experiments.) *This section is particularly relevant to an audience of academic colleagues or stakeholders but may not be useful to all stakeholder audiences.*

- Examples of students ‘getting’ the concept and ‘not getting’ the concept as a means of illustrating the behaviour witnessed either side of the threshold (e.g. Constantly looking to put things into practice and try things out, well before they are “ready”. Seeing all outcomes (positive and negative) as useful, or conversely: Planning one big bang launch, ploughing lots of personal resource into something before testing it out.)

This should produce a document that not only helps you refine and make robust your concept but also clearly expresses and articulates the threshold concept to others, enabling reflection, review, and implementation in the curriculum.

We have provided examples of the *CfIE TCs (with/without the ‘In Theory’ section at Appendix E and F)* and the *CfIE TCs Adoption Document* used at the CfIE (at Appendix H) as a means of bringing the final candidate threshold concepts together.

Thoughts on the process of Synthesis

The most challenging part of this process is synthesising all the different, and sometimes disparate, contributions from participants together into a coherent whole. Naturally, those doing the synthesis must endeavour to silence their own biases and refrain from adding in content and interpretation above and beyond that of the participants. Nonetheless, some interpretation will be required to filter, connect, and condense often divergently framed responses given as survey responses and focus group testimony into a coherent whole.

Having at least two researchers conducting the synthesis helped us challenge one-another, play devil’s advocate concerning interpretation, and make sure everything was discussed and debated before interpretation.

We would also recommend the use of shared visual methods for synthesis. We did try using Nvivo with limited success as the process was somewhat impaired until we started to work together visually connecting, combining, and extrapolated using alternative methods. In the earliest stages of our research we used Mural extensively to capture items of contribution, to cluster, connect, and nuance those items, and then to synthesise them under new headings, essentially a process of thematic analysis. In later stages when we had emerging threshold concept statements which we were beginning to assemble as *in practice, in theory, examples of students ‘getting’ and ‘not getting’* we turned to shared word documents, making heavy use of comments, and tracked changes to retain a memory of how the process was evolving. Successive versions were retained to show changes that had been made yet also keep a clear sense of what the refinements had led us to.

The process is ultimately somewhat subjective, but the repeated cycles of consulting with participants helped us spot where we might have over-synthesised or misconstrued earlier remarks and then correct them.

Student Perceptions of CfIE Threshold Concepts (Concept Mapping)

As part of the research conducted into developing Threshold Concepts in Entrepreneurial Thinking at the Centre for Innovation and Entrepreneurship (CfIE) at the University of Bristol we ran a series of concept-mapping exercises with students to determine what they themselves had identified as important within entrepreneurial. This was to establish what they already perceived as being present within the existing curriculum and help us see where we might target the process of embedding the concepts.

It should be stressed that at the time of this research no effort had been made to embed the CfIE threshold concepts for entrepreneurial thinking in the curriculum.

Over two dates we hosted participants in parallel sessions. On one date we hosted participants from years 1, 2, and 3 of the 4-year integrated undergraduate masters degree programme (UG). On the other date we hosted participants from year 4 of the undergraduate programme (UG), from the one-year postgraduate taught masters programme (PGT), and from the postgraduate research programme (PGR).

Concept Mapping

In this element of our research we have used Concept Mapping as a means assess how students understand the component elements of entrepreneurial thinking and how they interconnect.

Concept mapping is a means of visualising the interrelationships between concepts in an integrated, hierarchical manner and requires the identification and prioritisation of key concepts and principles. It allows issues of integration, tacit knowledge and understanding to be made explicit (Kinchin et al., 2011). It is informed by assimilation theory (Ausubel, Novak, & Hanesian, 1968) and constructivist epistemology. Concept mapping allows attention to be paid both to how material is taught and to how it will be learned, enabling a conceptually transparent curriculum (Novak, 1991) that supports learning (Kinchin et al., 2011).

Method

Students were recruited by emails to each year group within the CfIE and by posting recruitment messages to the CfIE's internal MS Teams group and LinkedIn group (see *Concept Mapping Recruitment Message, Appendix I*).

Over two dates (the 15th and 17th June 2021) we ran two online workshops using MS Teams to provide a channel for communication for groups, and we used Mural to supply each group with a virtual whiteboard space to make their maps.

We provided an explanatory briefing note on concept mapping beforehand, alongside participant information, and recapped this at the start of each session to establish participants understood and consented to what was going to happen. We added further detail on what 'good' concept maps would look like – i.e. setting out dynamic relationships.

Each year group was clustered together, established in a breakout room, and provided with its own Mural. The facilitators moved between the rooms to again check understanding and answer questions.

The groups were given an initial 30 minutes to start to develop their maps in response to the challenge: **“What do you need to understand in order to understand how to think like an entrepreneur?”**

After the first phase of development we brought all the groups back together to discuss their processes and answer any questions that had arisen. We then provided another 10-20 minutes (based on participant requests) to allow them to further develop their maps.

We then asked each group to give us a brief account of their map and enabled some discussion as a whole group.

We finished by setting out our own research and highlighting where the participants had hit upon the same or similar concepts.

The Results

Year Group	No of Participants	No of Concept Notes	No of TCs present	Which TCs were identified?	Characterisation of map structure	Structure Quality	Explanatory power (dynamic propositions)	Quality of Map (No of TCs + structure quality + explanatory power)
UG 1	1	11	3	1, 4, 6	Deep	weak	good	average
UG 2	1	38	3	1, 2, 3,	Disconnected (1 Deep chain)	weak	good	average
UG 3	3	67	5	1, 2, 4, 5, 6,	Normal	good	weak	good
UG 4	2	41	6	1, 2, 4, 5, 6, 7	Interconnected	good	good	very good
PGT	4	31	5	1, 2, 4, 5, 6	Broad	weak	good	good
PGR	1	33	3	2, 3, 6	Broad	weak	weak	weak

As the construction of a concept map is better suited to the presentation of the perceptions of the map’s author, than to the reproduction of memorized facts, concept map analysis is not a straightforward matter (Jonassen, Reeves, Hong, Harvey, & Peters, 1997). A concept map requires both the representation and the organization of ideas (Halford, 2014) and can be seen as a portrayal of a mental model (Kinchin, Hay, & Adams, 2000). Concept map analysis has historically been undertaken quantitatively, based on derivatives of a scoring protocol devised by Novak & Gowin (1984) which include measures of valid links; the degree of cross-linkage; the amount of branching; and the hierarchical structure, sometimes in comparison with an ‘expert map’.

For this analysis we have included a count of the number of concepts provided, the number of our CfIE Threshold Concepts (TCs) that they explicitly or implicitly identified, a characterisation of their map structure (Buhmann & Kingsbury, 2015), and a characterisation of the general level of the explanatory power emerging from the ways in which relationships are described (i.e. static, non-causative dynamic, causative dynamic, and quantified and qualified causative dynamic) (Kinchin, 2016).

Whilst we only had single participants from the year 1, 2, and PGR groups we had 2 year 4 UGs, 3 year 3 UGs, and 4 PGTs. As a small sample the conclusions we can draw from this exercise are limited in their scope.

Overall the scale and complexity of maps increased as students progressed through their studies, as did the quality of the structure and explanatory power. It should be noted that PGT students, whilst advanced in their studies will have spent far less time in the CfIE curriculum environment than their Year 3 and Year 4 UG colleagues. Our PGR is completely new to the CfIE and has not been 'taught' within our curriculum in the same manner as the other participants.

It was satisfying to see that not only do our CfIE threshold concepts seem to be largely apparent in the existing curriculum but that the students recognise this. Every 'taught' participant identified that *Entrepreneurship is a Practice* and each succeeding year seemed to recognise more of the concepts than the earlier years. Naturally, some students are more drawn to some concepts than others, for example our singular participants from Year 1 and Year 2 are quite different in temperament and interests and this may be reflected in their focus on different elements of thinking like an entrepreneur.

Nonetheless, this is just a starting point, and we will need to repeat the exercise in future years to establish how we are progressing with the embedding of the CfIE threshold concepts.

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