Appendix 1: interview consent form

EDTeC
EDUCATIONAL DEVELOPMENT & TECHNOLOGY CENTRE

THE UNIVERSITY OF NEW SOUTH WALES

Participant information statement and consent form 1

Participant information: Innovative Teaching and Educational Technology

You are invited to participate in a study of how individual teachers who use online learning technology in UNSW are influencing learning and teaching practices and systems throughout the institution.

You were selected for this study because you were awarded an Innovative Teaching and Educational Technology (ITET) Fellowship. I hope to learn about:

- influences on your approach to learning and teaching in your discipline
- your strategies for using educational technology to improve teaching
- how the ITET Fellowship has influenced your approach to learning and teaching.

Data collection

The main data for the study is from one hour individual interviews, during which I will use mapping software to create a cognitive map – a graphical representation of your strategies for use of educational technology in learning and teaching, and of the various influences upon this. During the interview, you will have an opportunity to review and agree the representation in the cognitive map. You will also be given a printed copy of the map, and can suggest further changes at any point within the following month. You may find this helps with further development your strategies for learning and teaching, by providing an additional way of representing them.

The study may also refer to records of discussions at Fellowship events.

Confidentiality

If you give your permission by signing this document, I plan to discuss/publish the results as part of an evaluation of the Fellowship programme for UNSW. The results are also providing data for my PhD thesis on 'Online teachers as change agents in universities', with the Open University Business School in the UK. I may also submit some of the work as journal or conference papers. I will keep you informed of publications that make use of the data you have provided.

In any publication, information will be provided in such a way that you cannot be identified. Only general patterns from a number of maps or discussions will be published. The individual maps or texts, whether in the original or in a reinterpreted form, will not be made available to a third party. However, at a later stage I may seek specific written permission from one or two participants to use their cognitive maps anonymously to illustrate the analysis techniques. The maps will be treated as confidential, and stored securely in electronic form, as will records of Fellowship group discussions.

Complaints may be directed to the Ethics Secretariat, The University of New South Wales, SYDNEY 2052 AUSTRALIA (phone 9385 4234, fax 9385 6648, email ethics.sec@unsw.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome. If you have any questions, please feel free to ask. You will be given a copy of this form to keep.

Consent form

Your signature indicates that, having read the Participant Information Statement, you have agreed to take part in the study.

…… Signature of research participant	…… Signature of investigator
…… Please print name	…… Please print name
…… Date	…… Date

REVOCATION OF CONSENT

Innovative Teaching and Educational Technology

I hereby wish to WITHDRAW my consent to participate in the research proposal described above.

……

Signature of research participant

……

Please print name

……

Date

The section for Revocation of Consent should be forwarded to Carol Russell, EDTeC, University of New South Wales.

Appendix 2: Cognitive mapping

The value of cognitive mapping lies in its ability to make explicit an individual's assumptions about causal connections and ways of categorizing experiences.

A spoken sentence can give clues to a person's cognitive mapping assumptions. For example, the sentence 'All university academics are primarily interested in research, and therefore prioritize research work over teaching.' hints at a number of assumptions, as follows:

- The boundary is all universities.
- The system components are professional categories within universities.
- Academics, as entities within one of these professional categories, are all alike.
- Research as a subcomponent of professional activity is assumed, always or on average, to take precedence over teaching, another subcomponent.

Within this map, there is a causal relationship between the first three modelling assumption and the fourth, illustrated in Figure A2.1. However, the map can become the focus of a conversation to check out these assumptions, and to clarify and confirm how the speaker perceives the causal links in the topic of conversation.

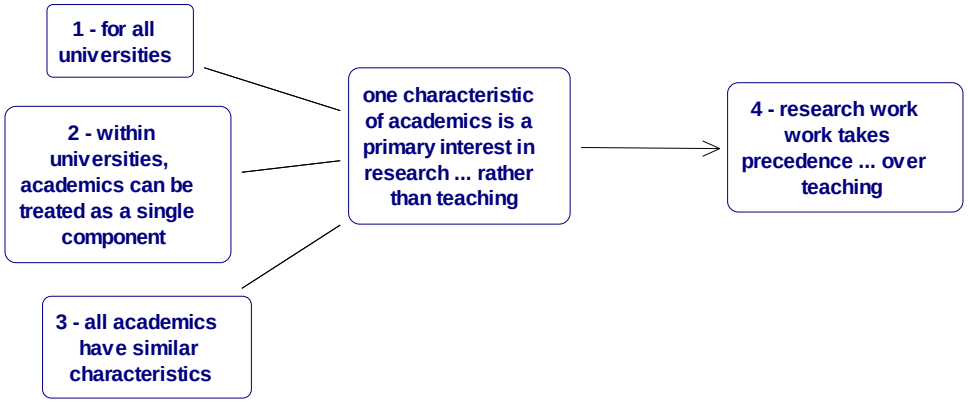


Figure A2.1 A cognitive map from one sentence, showing implicit modelling assumptions

Preparation and prior practice

I had already used Decision Explorer software collaboratively with one of the ITET3 Fellows, in a project on curriculum strategy development for the Faculty of Engineering, in combination with the balanced scorecard technique (Kaplan and Norton, 1996). The balanced scorecard identified, from different perspectives, outcomes sought by various stakeholders. The cognitive mapping developed a visual representation of links between all the internal and external processes. Combining the balanced scorecard with cognitive mapping provided a thorough examination of the context which enabled the development of a clear visual representation of a curriculum development strategy. The cognitive map was a more holistic and interconnected representation than the scorecard lists, and was therefore better able to guide the operational decisions of individual departments towards the achievement of shared goals. I went through several cognitive mapping sessions with my collaborator, in which she talked through the various influences and how they linked together, while I created a map. There were several iterations in which I tidied the map after the interview and then amended it in further discussion with her. The end result was a curriculum development strategy that could be shared with others (Wiley and Russell, 2003). The experience of this work developed my skills with the software, and enabled me to set up a shorter interview process suitable for use with a larger number of participants.

I also took advantage of a visit to Glasgow to meet briefly with Professor Fran Ackermann in the University of Stratchclyde, co-author of a book on the use of cognitive mapping in strategy development (Eden and Ackermann, 1998). Discussions with Professor Ackermann confirmed that my intended approach was a valid research method for this context.

Preparation of the participants also helped set up the interview process. I had already spoken with each of the ITET4 Fellows during the course of their initial enquiries about the programme. So they knew my role and I already knew a little about their backgrounds and interests. I emailed each one individually to invite them to the interview before the start of the Fellowship programme, including the following text:

> "The interview will involve using Decision Explorer software to help us build a cognitive map – showing the learning and teaching issues/concepts that most concern you, and how you link these together. My plan is to spend half an hour on the mapping itself, so the whole thing should take no more than an hour in total. I'll probably tidy up the map layout after the interview, so that it's easier to read (they often end up being quite large and complex). Then I'll send you a copy to check that I haven't misrepresented your thinking. Cognitive mapping is most often used as a strategy development process, so you should it useful for clarifying some of your own thoughts and priorities before you begin the Fellowship."

Interview skills

NLP (neurolinguistic programming) offers some practical techniques for eliciting emotional and behavioural as well as cognitive strategies. It also offers a language with which to describe and codify some of the unconscious interaction that takes place during an interview. As I have been trained as a practitioner in NLP I explored whether any NLP approaches would be useful for managing the interview process. However, there is very little published research evidence on NLP. Most of the published work is from contexts where belief change is actively sought, for example psychotherapy or sales techniques, and is inconclusive (Thomson et al., 2002). Research on its effectiveness in management does, however does indicate that some techniques are useful in management learning (Dowlen, 1996). From the research that is available, and from my own experience, I identified the following skills and techniques as relevant for the cognitive mapping interviews:

- being aware of language patterns and non-verbal signs, to help establish rapport and to notice where there is an opening to explore further
- using a "well formed outcomes" checklist to surface any unspoken reservations about espoused theories (O'Connor and Seymour, 1990)
- "meta-model" questioning techniques to seek clarification of what a generalized statement means (O'Connor and Seymour, 1990)
- "logical levels" – environment, behaviour, capability, belief, identity, spiritual – to elicit strategies (particularly suited to cognitive mapping, and with the potential to surface emotional as well as explicitly rational logical links. (Dilts, 1990)

The first three are related to standard interview skills. The fourth provides a way of organizing the different ways in which the participant perceives their choices. The NLP framework simply provided me with a mental checklist. I used the Dilts logical levels as the basis of the concept coding scheme shown in Figure 4.6, which provided a simple way of incorporating the level of emotional commitment to particular concepts without the emotional dimension becoming a central focus of the discussion. I did not introduce questions about emotional aspects of teaching, but merely included in the cognitive maps whatever the participant described as relevant to learning and teaching practice.

Mapping experience

Using software while talking with someone involves juggling attention between the computer screen and the person, which can make it difficult to maintain eye contact and rapport. My solution was to involve each participant in decisions about the map as it developed, so that it became a joint focus of attention for both of us. This was easier with some people than with others. Some were instantly fascinated and engaged by the mapping process, others less so.

After the first few interviews the mapping process became easier, in that most amendments to the map were done during the discussion and there was less need to amend the map afterwards for clarification and then check it with the participant. At the end of the interviews, participants were often able to take away a finished printout of their maps that they were happy with as a representation of their strategy. In my research log notes at the time, I noted the following factors which I believed were contributing to my skill with the cognitive mapping interview process.

- I took time to explain the process and establish rapport with the participant before starting the mapping.
- In the pre-ITET interviews, I showed to the participant the list of issues from previous ITET Fellowship discussions, as an indicator of the scope of what was expected. (On one occasion when I missed this and the participant seemed more hesitant than others about where to start and what to mention.)
- When participants talked a lot without looking at the map, I made a point of stopping and asking them to attribute/confirm links and concept styles every 6–8 concept entries. This ensured that they were engaging with the way the map was representing their thoughts.
- When I reworded concepts for brevity, I checked with the participants that the words I used captured what they meant. Often this took a few attempts but it gave me a much clearer idea of their thinking, and often helped to clarify and simplify the maps.
- I rearranged the map spatially as we talked, grouping, linking and merging concepts in consultation with the participant. When I allowed the map to get tangled and messy, it was hard to tidy up afterwards without making assumptions about the thinking represented, and there was no immediate clarification with the participant. When we produced maps that made sense to the participants, they were able to leave the interview with a visual representation of their strategy that they were happy with.

References

DILTS, R. (1990) *Changing belief systems with NLP,* Capitola CA, Meta Publications.

DOWLEN, A. (1996) NLP- help or hype? Investigating the uses of neuro-linguistic programming in management learning. *Career Development International,* 1**,** 27-34.

EDEN, C. & ACKERMANN, F. (1998) *Making Strategy: the journey of strategic management,* London, Sage.

KAPLAN, R. S. & NORTON, D. P. (1996) *The Balanced Scorecard,* Boston, Harvard Business School Press.

O'CONNOR, J. & SEYMOUR, J. (1990) *Introducing N L P (neuro-linguistic programming): psychological skills for understanding and influencing people,* London, San Fransisco, Aquarian.

THOMSON, J., E., COURTNEY, L. & DICKSON, D. (2002) The effect of neurolinguistic programming on organizational and individual performance: a case study. *Journal of European Industrial Training,* 26**,** 292-298.

WILEY, D. & RUSSELL, C. (2003) Evaluating curriculum development in engineering education using the balanced scorecard and cognitive mapping. *7th Baltic Region Seminar on Engineering Education.* St Petersburg, Russia, 4-6 September 2003, UICEE.

Appendix 3: Research log extracts showing development of map analysis process

This Appendix contains extracts from my research log between March 2005 and January 2006, which refer to the analysis process.

The extracts are included here to show how much trial and error, iteration and double checking was involved in developing the final map analysis process reported in Chapter 4 and Appendix 4, which I used to obtain the results reported in Chapter 5.

In various places I refer to other records of the detailed process, in spreadsheets and powerpoint files, which I used to ensure that the processes were applied consistently – particularly important when I often had to leave the analysis aside for some time. These are available on request.

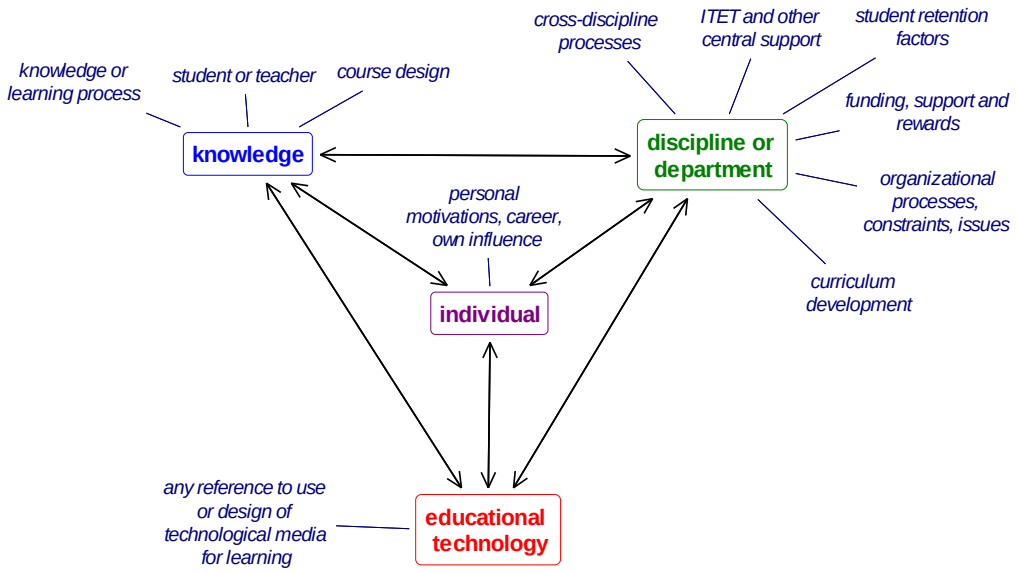
Recoding and initial analysis of recoded maps

The extracts below are single continuous sections from each entry unless indicated in brackets thus [...] or with a cross-reference to material included elsewhere in the thesis thus [X-ref].

log entry 31 March 2005

I am now doing the analysis of the post-ITET maps, following the same process I worked out for the pre-ITET maps. So far I have:

1. Recoded all the maps with the discipline model concept categories as follows:



2. Printed out copies of the recoded maps – as a back-up and reference in case I lose or change the file, and also so that I can check the recoding consistency on hard copy.

3. Used the 'sort' command to pull out the 12 sets of connections between the 4 concept categories. (I found it easier and faster to do this all in one go, because I could build up my keyboard speed and accuracy with repetition.)

I've realised that I should record what I do in more detail. Initially I found it hard to remember exactly which Decision Explorer command sequences I used before. I also had to check through various files to recall how I created and sorted the table of concept links – apparently just copied the lists straight into a Word table, applying styles to match the text colour coding

from the maps – one line for each person/map and a column for each of the 6 sets of links between ET, D and K as follows:

Map	K-D	D-K	K-ET	ET-K	D-ET	ET-D
name	Members of K going INTO D are : knowledge 1 concepts. Members of K going OUTOF D are : knowledge 1 concepts.	Members of D going INTO K are : discipline or department 1 concepts. Members of D going OUTOF K are : discipline or department 1 concepts.	Members of K going INTO ET are : knowledge 1 concepts. Members of K going OUTOF ET are : knowledge 1 concepts.	Members of ET going INTO K are : educational technology 1 concepts. Members of ET going OUTOF K are: educational technology 1 concepts.	Members of D going INTO ET are : discipline or department 1 concepts. Members of D going OUTOF ET are : discipline or department 1 concepts.	Members of ET going INTO D are : educational technology 1 concepts. Members of ET going OUTOF D are: educational technology 1 concepts.

4. I then checked through the recoding on the hard copy maps and amended 11 of the maps – usually just 1 or 2 concepts in each – and updated the connection lists affected.

I used the same process as before: I printed out the summary maps and cut them into individual maps, then grouped them visually – initially by patterns of links, then by common concepts).

1. Copy all the K, D and ET concepts from the summary maps in the pattern group into a new map. Ensure separation of concept numbering. (Hide links at this stage to aid reading.)
2. Use a scratch view to merge identical K concepts, D concepts and ET concepts.
3. At the same time, combine closely related concepts to simplify. For example, where opposite concepts (e.g. curriculum development and constraints, or departmental change and resistance to change) both occur, merge these to form one binary concept. Where a number of concepts of a similar type occur, merge them into a collective concept (e.g. animation, VR, quizzes, etc. are all specific media or tools).
4. Delete those concepts that are not a core part of the pattern - e.g. an odd concept that occurs in only one in 4 maps in the group.
5. In a separate view called ‘pattern’, bring in the main concepts that characterize the pattern. Switch on the show links, and show unseen links for the selected concepts.
6. Bring the linked concepts into this view.
7. Arrange the results grouping K, D and ET concepts as in the other summary diagrams and maps [K top left, D top right, ET at the bottom and I in the middle]. The resulting map should then show the core concept links in this pattern.

log entry 9 July 2005

After starting to look for patterns in the post-ITET maps I realised that I had not been consistent in the way I had recoded using the Becher model between the two sets of data. For example I had coded reference to ITET as being about individual decisions in the pre-ITET maps, and coded it as a departmental concept in the post-ITET maps.

I therefore decided to review and amend the pre-ITET map recoding to make sure that I had a clear and consistent way of categorising the concepts expressed in relation to the Becher model.

This has taken me several weeks, as I’ve not had much time, and it’s hard to be consistent doing this kind of work in fits and starts at weekends. However, I now think I’ve managed to finish, and document, exactly what I’ve done in a way that’s repeatable for the post-ITET maps.

The whole process was very useful. I realised that my text analysis of discussion transcripts using NVIVO provides some groundwork and also some data that I may be able to use in analysing the comparison of pre-ITET and post-ITET maps.

What I've done so far has been an iterative process is listed below.

1. I recoded the maps more consistently using the Becher + educational technology model.
2. I listed the K, D, I and ET concepts in each map and imported these via Word rtf to NVIVO.
3. I coded them by searching for each of the 4 heading categories, spreading the coding to sections, to create a list of all the concepts in all maps in each of the 4 groups.
4. I browsed and coded each of these 4 nodes to identify recurrent themes. This brought out some remaining inconsistencies in the recoding done on the maps.
5. I then created and applied a consistent set of nodes and amended the map recoding to match.
6. I then deleted the concept documents, and re-imported more consistently coded versions and repeated steps 3 and 4. This shouldn't really have been necessary, but the NVIVO coding wasn't consistently applied the 1st time – probably because of breaks between analysis sessions.

I now have a consistent set of summary nodes applied to all the concepts in the pre-ITET maps. The next stage is to find an efficient and reliable way of using these to merge the map concepts to create summary maps. In the earlier analysis I did this simply by looking at the maps. Now, I'm wondering if this was rigorous enough.

I can export the nodes into Decision Explorer to create a combined map. But there is no automatic way to use these nodes to merge concepts in the individual maps so that I can retain the links. I will probably have to do this manually, as follows.

7. Create a Decision Explorer map with all the exported NVIVO nodes. Create a new stylesheet with the D, K, I and ET styles, and also Ds, Ks, Is, and ETs styles for the summary concepts - same colour and different shape? Make different views for each of the four groups.
8. Create a copy of each recoded map, separate out the D, K, I and ET concepts into different views, then import the summary concepts and merge into these, using node coding report from NVIVO for the corresponding concept list document as a guide.

log entry 24 July 2005

Results

I have now completed steps 7 and 8 for the pre-ITET maps. It took me a while to do this. Exporting the NVIVO coding worked, but there were still a few node coding inconsistencies and errors, which I had to go back and change.

For the summary concepts I created new styles in DE - same colour coding but changed the shape from rounded square to oval.

Just so I don't forget how I did it, the detailed process I followed was:

7 (i) In the NVIVO node explorer, select one of the 4 top level tree nodes (e.g. 'knowledge') then go to 'tools', 'Export to Decision Explorer'. Check 'node title', 'specific node title' and 'node description) then press OK to create the .nde export file.

(ii) Open DE and import each of the four files to create a template map of all the summary nodes. Put them into separate views "knowledge', 'department', 'educational technology' 'individual'. Create a blank 'wholemap' view.

8. (i) In NVIVO, create a document coding report for each document (person), save as an rtf file and print.

(ii) In DE, open the NVIVO nodes template map and save it in a new DE map (1stname2ndname1summary). Open the recoded map for that person, then copy and paste all the concepts into the 'wholemap' view. Go to the each of the four views and, referring to the printout, delete those summary concepts not listed. Bring in the set of individual concepts and merge them with the appropriate summary concept. (e.g. 'bring K' in the knowledge map, group the K concepts under the summary concepts and merge the group into each other and with the summary concept).

After I'd done this, I laid out each map as in the K, D and ET concepts printed out the 19 summary maps.

It was some relief to see that the summary maps corresponded fairly well to those generated by the previous analysis method - which involved making my own summary looking at a table of linked K-D-ET concepts and the link density pattern. So I now have 3 different representations of the K-D-ET linkages.

There are some patterns that occur across disciplines, which might represent a shared understanding of the organizational context. Others seem to group by discipline, as in Table 1. [See Table 5.1 in Chapter 5]

Software problems

The tools aren't that easy to use reliably. Both NVIVO and Decision Explorer sometimes refuse to respond to commands. When I thought I had recoded something in NVIVO it hadn't happened, or when it had, it didn't show on the coding display. I'm also having difficulty with DE 'bring' and 'mapall' commands. The 'bring' command often doesn't show the requested concepts at first, and I have to keep changing the view scale and repeating to get them to appear. The mapall command didn't work at all with the combined group map. There were only 54 or so concepts, but perhaps the interlinking was too complex.

log entry 29 July 2005

Clarifying and confirming discipline patterns

I identified patterns in the summary maps by looking for occurrence of similar subsets of the summary concepts, and similar linkage patterns. There are many sets of these, some corresponding to discipline groups, others occurring across disciplines. Table 1 of the previous log entry [Table 5.1 in Chapter 5] lists those corresponding to discipline.

To clarify and confirm the links patterns more methodically, I used the following process to create a pattern map for each of the identified pattern groups:

8. Copy in the concepts from all the summary maps in each group into a new map, using the overwrite option to create a combined map for the group. Put this in a 'wholemap' view.
9. Where two opposite concepts are both present, merge them into one binary concept. This relates to the notion of dualities in the Pettigrew work.
   For example, curriculum development and curriculum constraints were combined, and departmental change and resistance to change.
10. Create a new view called 'pattern' and bring in the main concept(s) that characterise the pattern.
    For example in group A, this is 'IT as part of discipline' and 'current use of ET'.
11. Show unseen links for these concepts and bring the linked concepts in too.
    In group A, this brought in 10 more linked concepts, most in the ET category.
12. Arrange the results grouping K, D and ET concepts as in the other summary diagrams and maps [K top left, D top right, ET at the bottom and I in the middle].
13. Hide those concepts that are not a core part of the pattern - e.g. a concept that occurs in only one of several maps in the group.
    In group A, 'ET for student core learning' and 'apply current IT to teaching' , 'student responses and context' and [individual] ' interest in ET' all occurred more than once and were left in, but the 6 other linked concepts occurred only once and were hidden.

The resulting maps should then show how the common themes/concepts are seen to influence each other.

[See Table 5.2 in Chapter 5]

log entry 25 October 2005

Identifying discipline patterns in post-ITET maps

I used the same process as before: I printed out the summary maps and cut them into individual maps, then grouped them visually – initially by patterns of links, then by common concepts). Four mutually exclusive patterns emerged, but these do not fall into discipline groups. The remaining two maps both show pattern 5, which also occurs in two other maps. These patterns are listed in Table 1 and shown in Figures 1–5. [See Appendix 6]

I then began to create combined maps for each of these groups. However, I noticed that some of the links in the original maps were missing from a combined group map and I repeated the process to check this out. On investigation, I realised that using the option to overwrite concept numbers does not combine the concepts and their links, but deletes the previously copied concept, including all its links. This means I will have to re-do the pre-ITET pattern group maps.

The process for creating the pattern map is now:

1. Copy all the K, D and ET concepts from the summary maps in the pattern group into a new map. Ensure separation of concept numbering. (Hide links at this stage to aid reading.)
2. Use a scratch view to merge identical K concepts, D concepts and ET concepts.
3. At the same time, combine closely related concepts to simplify. For example, where opposite concepts (e.g. curriculum development and constraints, or departmental change and resistance to change) both occur, merge these to form one binary concept. Where a number of concepts of a similar type occur, merge them into a collective concept (e.g. animation, VR, quizzes, etc. are all specific media or tools).
4. Delete those concepts that are not a core part of the pattern - e.g. an odd concept that occurs in only one in 4 maps in the group.
5. In a separate view called ‘pattern’, bring in the main concepts that characterize the pattern. Switch on the show links, and show unseen links for the selected concepts.
6. Bring the linked concepts into this view.
7. Arrange the results grouping K, D and ET concepts as in the other summary diagrams and maps [K top left, D top right, ET at the bottom and I in the middle]. The resulting map should then show how the core concept links in this pattern.

I took screendumps of one example of the complete sequence and put them in a powerpoint show.

log entry 28 October 2005

Pre-ITET pattern group maps: corrections

The map merge process I used to create the pre-ITET pattern group maps in July was faulty, in that it would have deleted some of the concept linking. I therefore repeated the exercise with the same process as for the post-ITET maps.

[These amendments are included in the final version of Table 5.1.]

Note that the arrow directions in these maps are not significant, because the order in which the concepts are merged affects the direction of the combined links.

log entry 29 October 2005

Comparison of pre-ITET and post-ITET patterns

The pattern recognition process was done on both sets of maps independently, and came up with quite different groupings. A specific search for where post-ITET patterns occur in the pre-ITET maps, and vice-versa would show whether this reflects a real change – for example a sharing of ideas and strategies among the ITET Fellows. I looked only for the basic linking and common concepts, and not for all the characteristics of the combined pattern group map.

Final results of map analysis by discipline

log entry 5 November 2005

Overview of process

I have drawn a flowchart of the analysis process, put this onto a webpage and linked the elements in the chart to examples. [See Appendix 4]

log entry 27 November 2005

Individual/team analysis patterns

Pattern identification method

From the link summary maps, I noted the numbers of D–ET, I–ET and I–D links for each individual in a spreadsheet. I then sorted for the link density patterns and looked for common concepts to finalise the groupings. (See spreadsheet for details of the pattern grouping process.)

Pattern groups pre-ITET

Once I had identified pattern groups based on link density and common concepts, I produced a combined map for each group, using the same process as for the discipline pattern groupings, namely:

- delete concepts occurring only once or twice (depending on group size), combine similar concepts remaining
- create a new view and bring in core concepts (those represented in all maps in the group)
- bring in any other concepts linked directly to these core concepts.

log entry 4 December 2005

Pattern groups post-ITET

The link pattern groups identified corresponded to those in groups A–D in the pre-ITET maps. The departmental concepts relating to individual concepts showed the stronger patterns than were evident in the pre-ITET maps. (See spreadsheet for detailed record of pattern grouping process.

log entry 7 December 2005

Overview of process

The analysis process was similar to that used for analysis by discipline, but this time excluding the knowledge (K) concepts and looking for patterns in the relationships between individual (I), department (D) and educational technology (ET). To make the pattern recognition process even more explicit and repeatable, I listed link densities in a spreadsheet and sorted first for these, then looked for common concepts in the groupings that emerged.

This is a streamlined version of what I arrived at in the discipline analysis after much trial and error.

log entry 10 December

Map analysis for empowerment

Having reviewed the process by which I analysed the initial maps, I am happy with the way I did this part of the analysis. However, I will still have to repeat the pre-ITET analysis of the recoded maps because I have since changed the recoding. One of the recoding changes may make a significant difference to the results - categorising the ITET Fellowship as organisational (departmental) rather than individual.

I also need to remove two of the participants from the data set as they did not do a post-ITET map and did not sign consent forms for the use of their maps in this research.

The analysis process is different from that used to identify patterns related to disciplines or teamwork strategy. The main reasons for this are listed below:

1. In the maps recoded using the model based on Becher, the significant patterns to related to empowerment are in the numbers and directions of links between individual concepts and the three types of environmental factor (department, knowledge, technology).
2. The discipline and teamwork analyses sought to identify patterns in the strategies for dealing with external factors (extrinsic motivations). Here the point of analysing the recoded maps is to identify how the individual feels able to carry out actions or strategies in relation to these external factors. It is about intrinsic motivation and the power of the individual to take action upon it.
3. The direction of the linkage between concepts is significant in this case – specifically whether the individuals describe their influence upon, or how they are influenced by, other factors.
4. The summary maps for each individual do not show the direction of influence, since, in the merging of concepts into summary concepts, the resulting link directions depends on the order of merging. This was not important in the analysis for discipline and teamwork patterns.
5. The original maps are coded in a way that allows further exploration of intrinsic motivation (actions, capabilities and values/beliefs) in relation to the environment. The underlying model, drawing on Dilts' ideas, focuses on the individual rather than upon the academic environment. The concept coding was suggested by the individuals themselves during the interview, and is therefore a more reliable indicator of their sense of empowerment than recoding that depends on my interpretation.

I considered using NVIVO to group and summarise the concepts. However, on balance I think this would have few benefits as I am not creating summary maps, but simply listing the concepts influencing in each direction. Grouping these in Word tables makes the grouping criteria sufficiently transparent.

Map analysis for empowerment

log entry 26 December 2005

Results of re-analysed pre-ITET maps

I created a new version of the Table 1 from the previous analysis in April 2004, using the revised recoding scheme – setting it up as before to allow manual separation to show the frequency direction of influence between individual concepts and other categories of concept. (Table 1 Word document) From this table I pulled out various subsets to identify patterns in the linking, in relation to variations between individuals, and between types of concept.

5 of the 19 pre-ITET maps have no individual concepts, and therefore cannot contribute to this part of the analysis.

[The results from the remaining 14 maps are in Appendix 8]

To explore which of their own ideas about their personal characteristics, experiences or roles seem to be more empowering for them, and which seem disempowering, I counted the influence links into and out of the individual concepts. I then grouped these under summary topics (the same ones already developed for the discipline analysis).

The analysis was done in an Excel spreadsheet. [...]

Only influences occurring in more than one map have been included in the summary maps. A single occurrence is not a group or organizational pattern.

[...]

General comments

I double checked the summary concepts used in this analysis against NVIVO node coding reports, and found a few inconsistencies. After eliminating the inconsistencies and correcting the results accordingly, some of the weaker patterns shifted a little. So these weaker patterns are perhaps too sensitive to errors and variation in interpretation to rely upon for conclusions. However, some of the stronger patterns persisted:

- net influence of the individual upon their own learning and teaching knowledge, the (choice to do the) ITET Fellowship and curriculum development
- net influence upon the individual from time spent or required for developing teaching and educational technology
- mutual influence between the individual and various factors in the departmental environment, such as change initiatives and resistance to these, the availability of support systems for teaching and the valuing of research over teaching.

log entry 30 December 2005

Results from post-ITET maps

The analysis process was identical to that just completed for the pre-ITET maps, namely:

1. For each recoded map, copy from Decision Explorer into Word document table [Table1] the lists of individual concepts linking with other categories (i.e. the points of mutual influence between the individual's own actions, beliefs, characteristics and factors in the environment). Arrange the table to separate links going in each directions w.r.t. the individual concepts.
2. Give a negative point for each time an environmental concept is shown as influencing the individual or the individual is influenced by something, and similarly a positive point for each individual influence in the other direction. Add the total for each individual to create an indicator of how much they each feel able to influence these other factors. Display the distribution as a bar chart.
3. Copy the linked *I* concepts from Table 1 (sorting for and separating the ''into'' and ''out of'' links) into separate sheets in an Excel file.
4. Use the summary concepts developed in the NVIVO analysis to group and count influences in each direction. I found the most reliable way of doing this was as follows:
    - Use the Excel data validation by list to restrict options to the relevant node list from NVIVO
    - Create and save as an rtf file, a node coding report for each of the summary nodes. Use this to check the summary nodes once they have been allocated manually. This also acts as a spot check that the NVIVO coding makes sense. [I initially found that the list of nodes was too long, so I combined some nodes to correspond to the merged concepts in the summary maps for the discipline and teamwork analyses.]
5. Show this in tabular form, ranked in decreasing order of net influence by the individual, and as a summary map. [Table A and Figure 2]

6. Copy the linked *K, D,* and *ET* concepts from Table 1 into a second spreadsheet file. Summarise, sort and display as for the *I* concepts in stage 3 above. [Table B and Figures 3–5]

Five of the post-ITET maps had no individual concepts and were excluded. [...]

So in both cases the analysis is for a subset of 14 maps. In the summary maps, only influences occurring in more than one map are included, since a single occurrence is not part of a pattern in the group or organisation.

log entry 4 January 2006

Checking NVIVO coding

The results of the analysis of the maps for empowerment patterns show relatively small shifts in the relationships between concepts and therefore might be sensitive to inconsistencies in the coding for summary concepts. When I did the earlier analyses and created individual summary maps, I had noticed some errors, which I corrected in the maps and noted on hard copy. I also merged some closely related concept groups. I did not transfer all of this to the NVIVO coding at the time because the text selection in NVIVO had been clunky and inaccurate. [I have now added some more RAM to my computer, which seems to have helped with NVIVO performance – especially when I'm running several other applications at the same time.] Since have been referring to the NVIVO coding in subsequent analyses, I thought I should check it for consistency.

I reviewed the NVIVO coding, created a few new combined tree nodes corresponding to the summary mapping (leaving the component nodes intact, just in case they're needed later). Then I printed out the node coding reports for each of the summary nodes. I checked each list for queries and inconsistencies. I did find 20-30 concepts that appeared to have been coded inconsistently (out of more than 1000 total). However, when I started checking these against the recoded maps, I found that in many, the coding did make sense, and I had been misinterpreting an isolated concept wording because it was out of context.

Having taken about a day and a half to do this, I am now confident that:

1. There are no significant inconsistencies in the NVIVO node coding that will affect the validity of the results.
2. Cognitive mapping is a more accurate way of representing and analysing an individual's strategy than text analysis. Text analysis alone removes valuable information about what the individual means by the words in a particular context.
3. I can cut out the continual rechecking and get on with completing the last few parts of the analysis.

Map analysis using original coding: beliefs and values

log entry 8 January 2006

I've added to the NVIVO analysis a further set of nodes for the belief/value concepts in the original maps. However, I'm not sure how useful this will be, except for generating a list of those in each of the recoding categories.

The reason for selecting only concepts that the participants themselves identified as beliefs or values is that these are constructs that they don't wish to question, but simply to state as given. In most cases, beliefs/values appear as tail concepts in the cognitive maps, rather than being linked together as belief systems. They therefore indicate some of the deeper tacit understandings or assumptions that are influencing the explicit strategies expressed in the maps.

In the initial analysis for values, I created combined maps for the discipline groups and didn't come up with any meaningful difference between them. I have now combined the maps for the whole group and identify what values and beliefs exist overall – before and after ITET. [I produced a revised pre-ITET group summary map, with the two extra maps removed, so that there is a consistent set of 19 maps from the same people, using the same recoding scheme and summarizing process.]

results from this analysis are in Chapter 5

Map analysis for empowerment (original coding)

log entry 13 January 2006

Analysis process

I copied all the concepts from the 19 pre-ITET maps into a single map and did the same for the 19 post-ITET maps, to create a pre-ITET map and a post-ITET map for the whole group. On both of these, I carried out the following analysis:

1. Listed and counted concepts identified as
    a. environment
    b. action
    c. capability
    d. belief or value.
2. Listed and counted the links between each of these groups, putting the linked concepts into sets in Decision Explorer
3. Examined and summarised the patterns in the links denoting influences among these sets, without any reference to the content of the concepts. (It is the participants' categorisation that is significant in this part of the analysis - for their sense of influence, not the content.)

The results are shown in Chapter 5

log entry 16 January 2006

Analysing the content of linked concepts

I used the 'sort' function in Decision explorer to list linked concepts and put them into sets.

[...]

Listing, mapping and grouping the concepts in each of these sets gives an initial overview of what kinds of environmental and capability factors are perceived as more influential.

I tried various ways of doing this:

- created a summary concept for each topic and rearranged the concepts in groups around these in the map
- put the component concepts into sets (set names in bold in Table 2).

I thought this could enable further exploration of the linking between the most influential topics. However, on trying this with the largest set (env_curriculum) I found only 3 direct links into the whole 'AfromE' set showed up. This did not make sense, in that all 19 members of that set should link into a member of the 'AfromE' set.

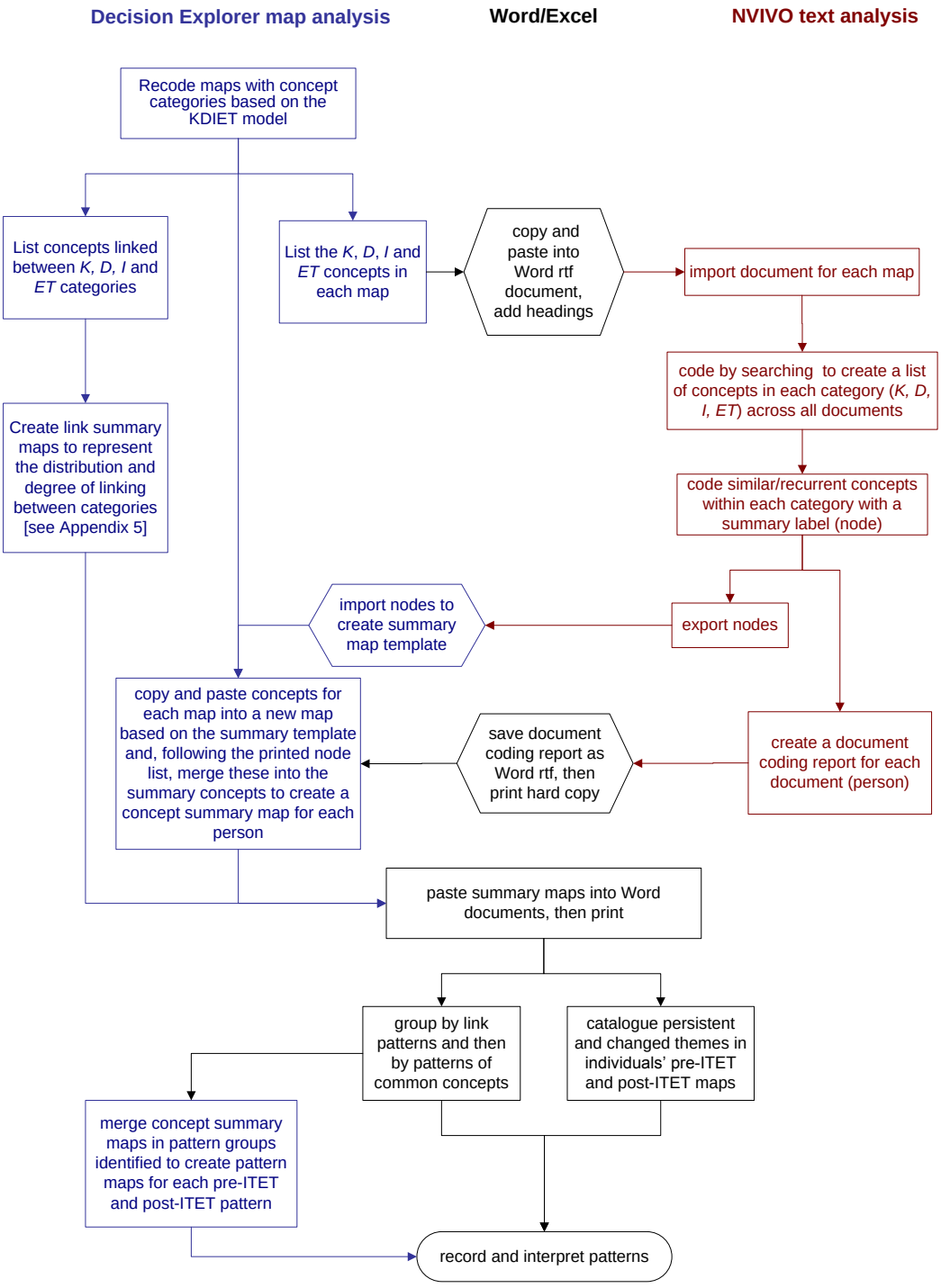
Checking a few sample links with the original maps, I found there were mistakes in two of the set definitions. This probably happened when I was doing a lot of repetitive operations and lost concentration. Only the links between environment and action concepts are affected. So I had to do these again. I also double checked all the other link sets to make sure that there were no other errors.

When I did explore the linking between the subsets of linked concepts, the numbers of links was coming down to around 5 or 6 in most cases – too few to indicate a general pattern. I have therefore probably reached the limit of reliable or meaningful analysis using the sets of linked concepts within Decision Explorer. Simply listing the content of the sets with the strongest linking is enough to show the overall patterns in the environment and in the Fellows' responses to it before and after the Fellowship experience. Beyond this there are diminishing returns for effort required.

The results are shown in Chapter 5

Appendix 4: Map analysis flowchart

The flowchart below shows the map analysis process in detail, as used for the discipline analysis of the recoded maps. The other analyses followed similar processes, using different map coding schemes and different sets of concepts and links, as outlined in Table 4.1.



Appendix 5: Link summaries

Table A5.1 overleaf shows the summary diagrams used for identifying patterns in the links between concept categories (sets) in the maps as recoded using the discipline model. The ID number in column 1denotes the participant and column 2 shows the participant's discipline group.

The link summary diagrams in column 3 were used to group the pre-ITET maps by patterns of linkage and the link summary diagrams in column 4 were used to group post-ITET maps by patterns of linkage.

In each link summary diagram, the large numbers in circles indicate the number of concepts in each set. Arrows indicate the existence and direction of links between sets. The smaller italic numbers indicate the number of concepts in each set linked to another set. (See Figure A5.1.) So, for example, the map from participant 1 has a pre-ITET map with 6 *K* concepts linking to *D* concepts, and 6 *D* concepts linking to *K* concepts. There are 10 *ET* concepts with 14 links to *D* concepts, and 3 *I* concepts. Post-ITET the same participant's map has18 *K* concepts, 7 *D* concepts and 10 *ET* concepts, with no *I* concepts.

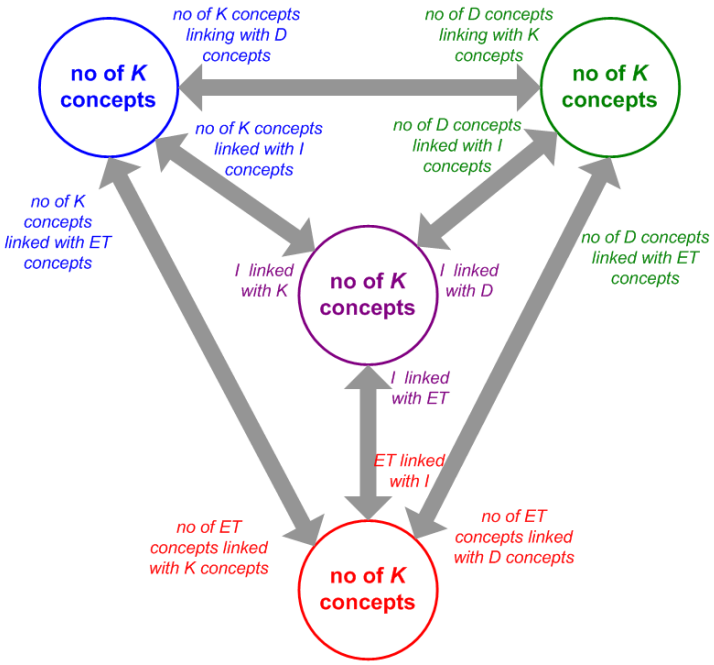


Figure A5.1 Key to link summary diagrams

Table A5.1 Summary of links between concept categories

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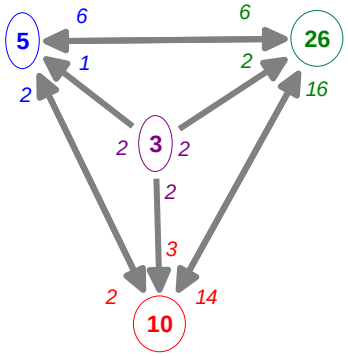
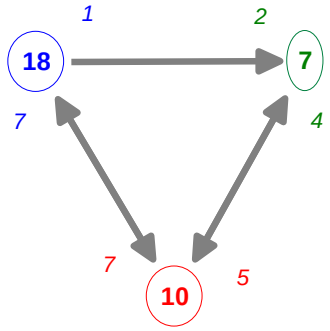
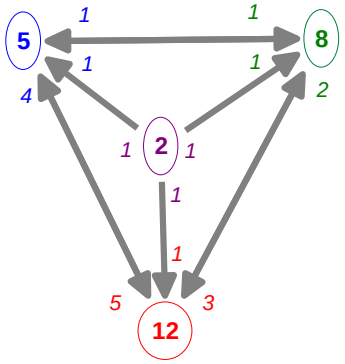
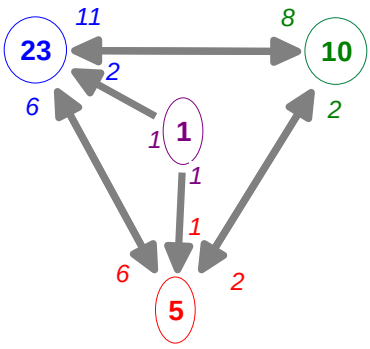
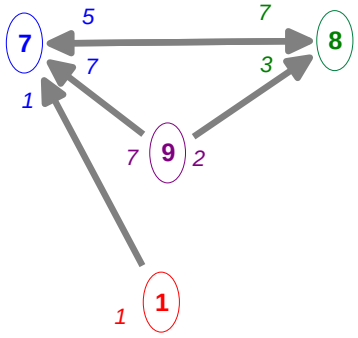
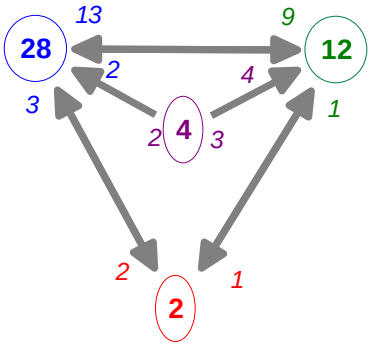
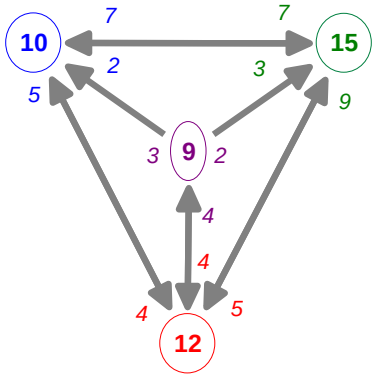
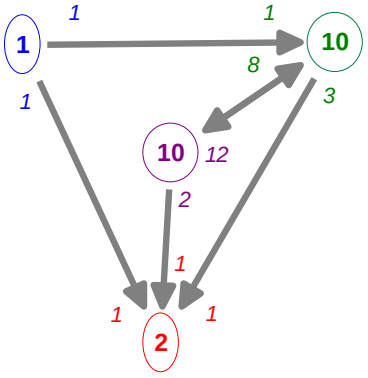
1	soft applied		
2	soft pure		
3	soft pure/hard applied		
4	hard applied		

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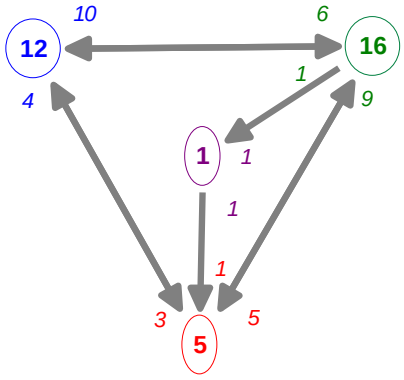
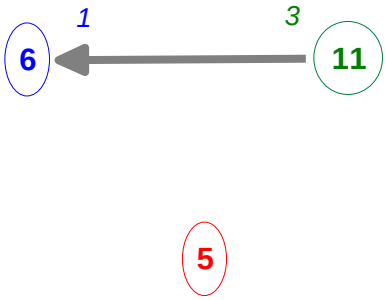
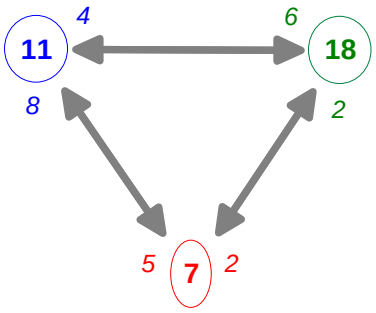
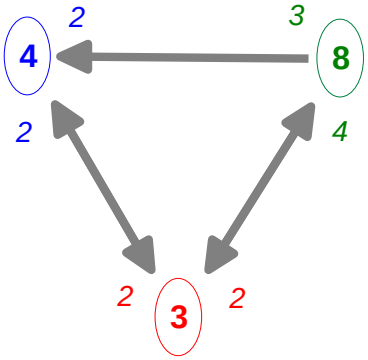
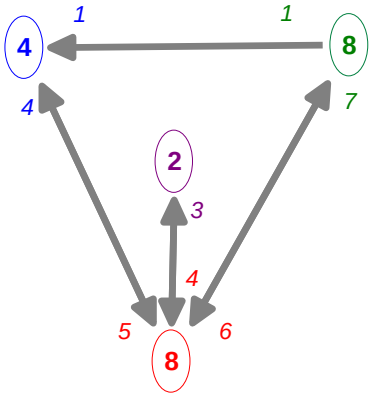
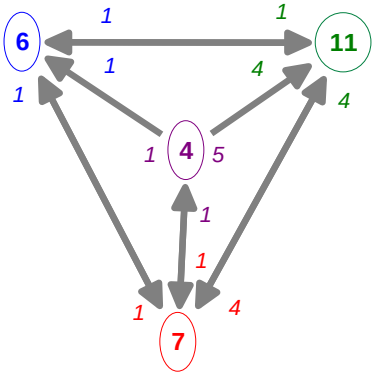
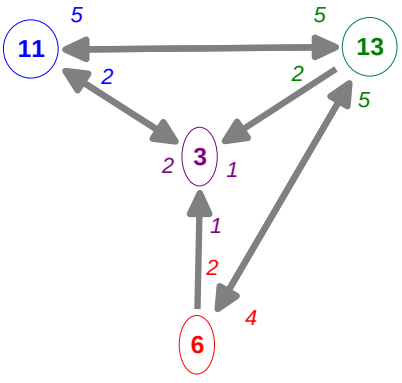
5	soft applied		
6	hard applied		
7	hard applied		
8	hard pure		

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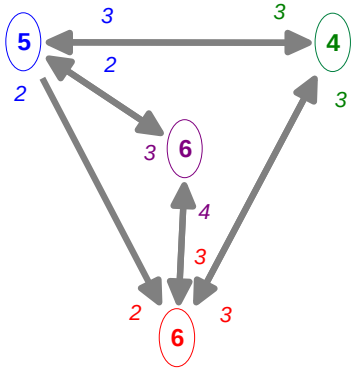
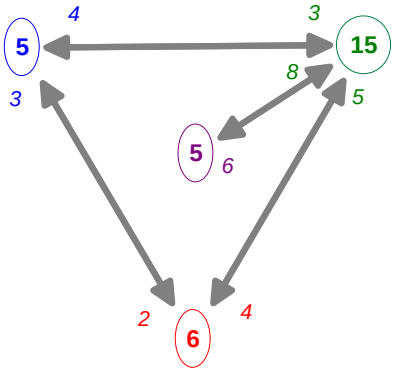
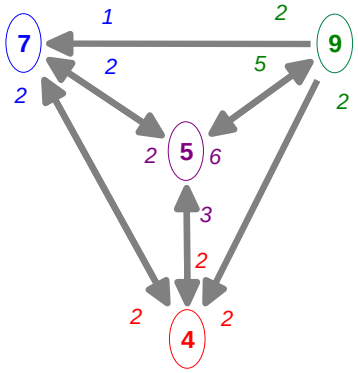
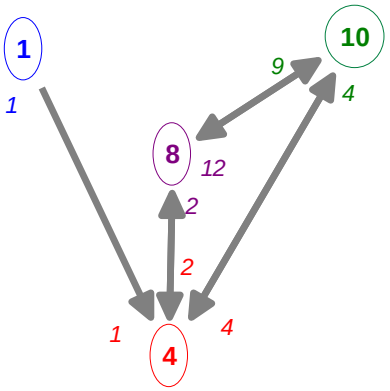
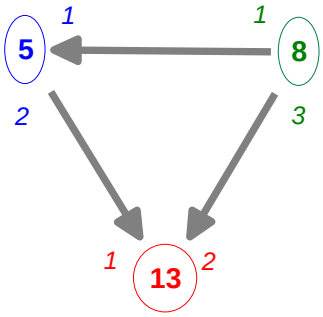
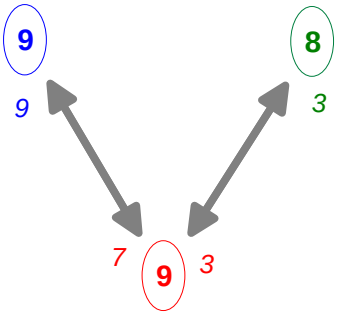
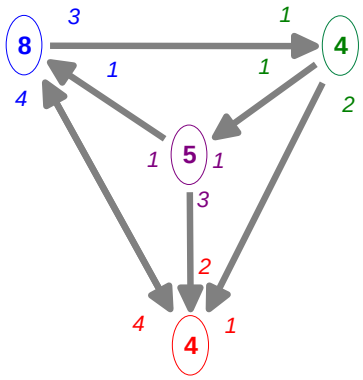
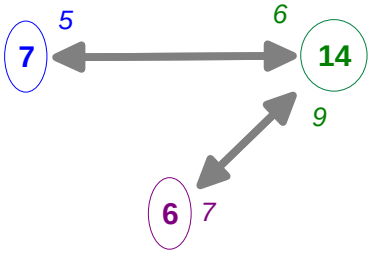
9	soft applied		
10	hard applied		
11	hard pure		
12	hard applied		

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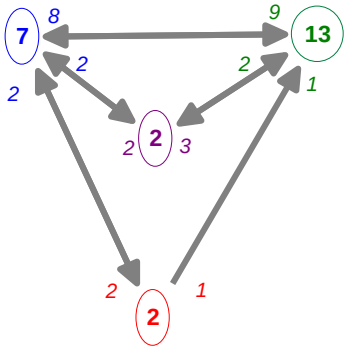
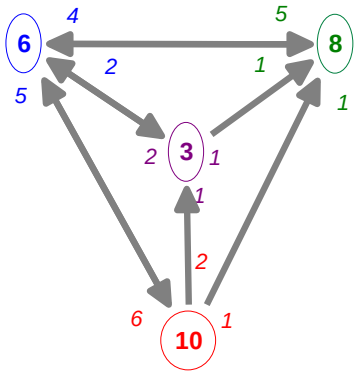
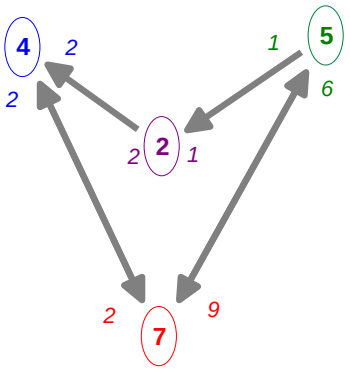
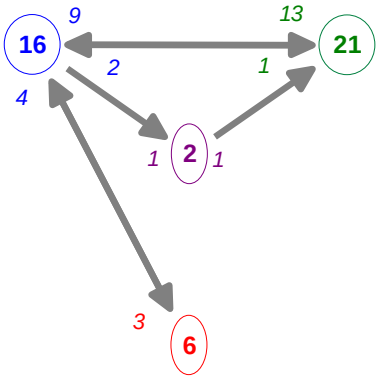
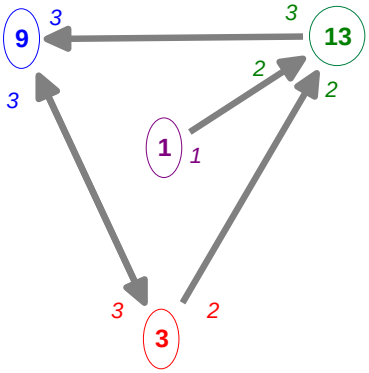
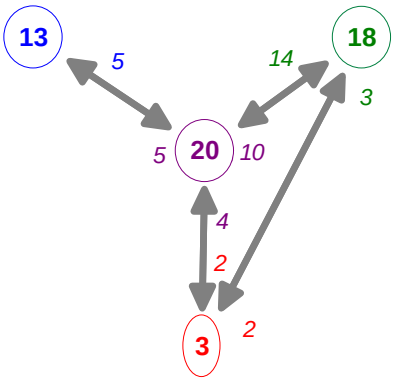
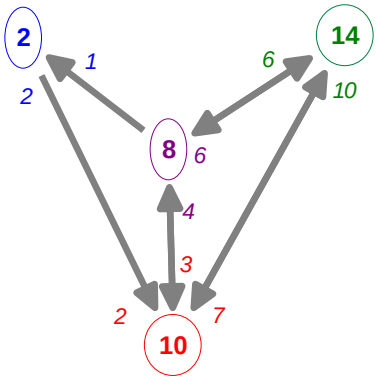
13	soft applied		
14	hard applied		
15	hard applied		
16	soft pure		

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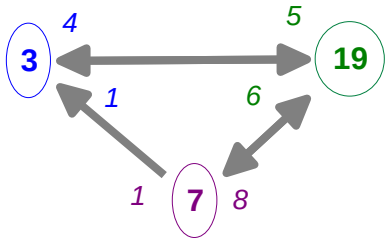
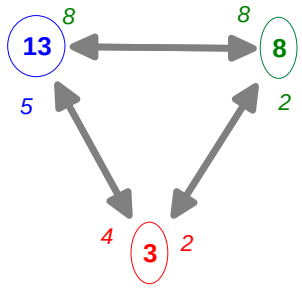
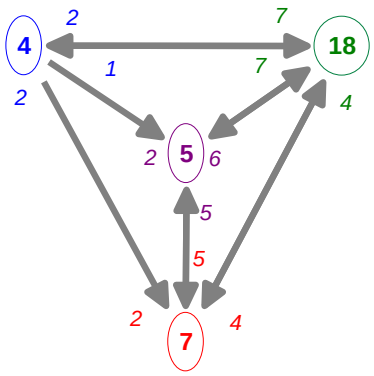
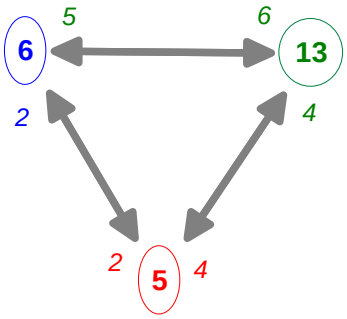
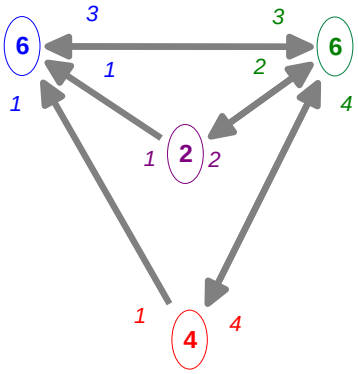
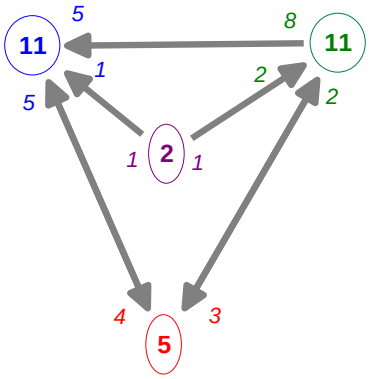
17	soft applied		
19	hard applied		
19	soft applied		

Appendix 6: Results of map analysis for discipline patterns

The results of the map analysis for discipline patterns are presented in four parts:

Pre-ITET patterns: For each of the seven patterns (A–G) identified, a general description of the pattern is followed by a list of common characteristics and a merged cognitive map of the strategy pattern.

Post-ITET patterns: For each of the five patterns (1–5) identified, a general description of the pattern is followed by a list of common characteristics and a merged cognitive map of the strategy pattern.

Comparison of pre-ITET and post-ITET patterns: Tables list where the post-ITET patterns occur in pre-ITET maps and vice versa, to track how strategies have spread.

Persistent and changed topics: Tables list where individuals have maintained or changed the topics contained in their pre-ITET and post ITET strategy maps.

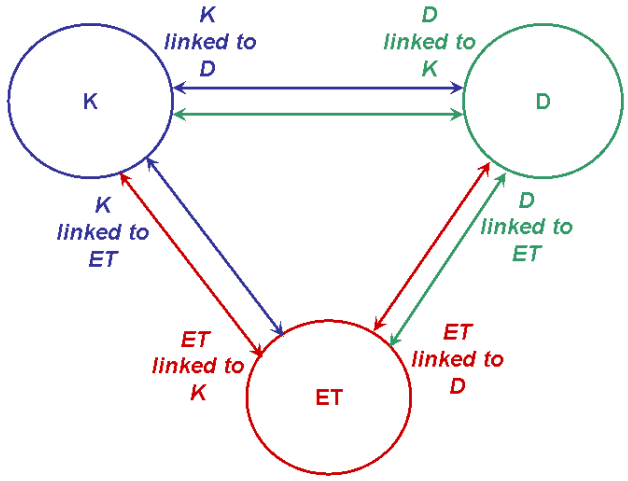


Figure A6.1 Concepts and links analysed

Note that in the merged summary maps for each strategy pattern, only the linking between topics is significant. The direction of the arrows does not imply any causal or influence pattern.

The common concept topics listed occur in all the maps in the group. The merged maps show other concept topics linked to the common topics in more than one of the group.

Pre-ITET patterns

Pattern A

Description

IT is part of discipline knowledge and this is linked with student responses and context. IT is also linked with an individual interest in educational technology, and a desire to apply current IT for student core learning. Current uses of educational technology have a negative interaction (i.e. are hindered by and/or are hindering) the use of technology for core learning.

Common concepts:

IT as part of discipline
current use of ET

Link pattern:

D concepts mostly link directly into *K* or *ET*, rather than with each other. *ET* concepts are interlinked.

Occurs in:

Four maps, all from hard applied disciplines (engineering/applied science)

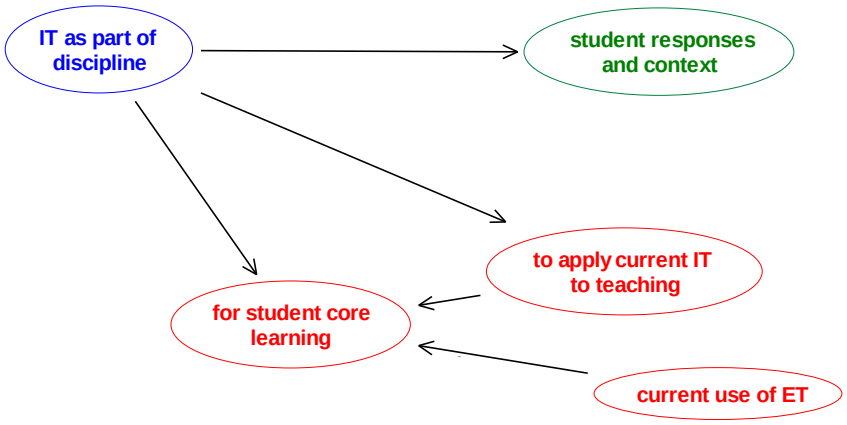


Figure A6.2 Pre-ITET strategy pattern A

Pattern B

Description

Educational technology is being used, and there is recognition of the time needed to develop it. Student diversity links to curriculum development and to student learning.

Common concepts:

current use of ET
time to develop ET

Link pattern:

K and *D* concepts link directly to *ET*.

Occurs in:

Three maps, all in hard applied disciplines (engineering/design/applied science)

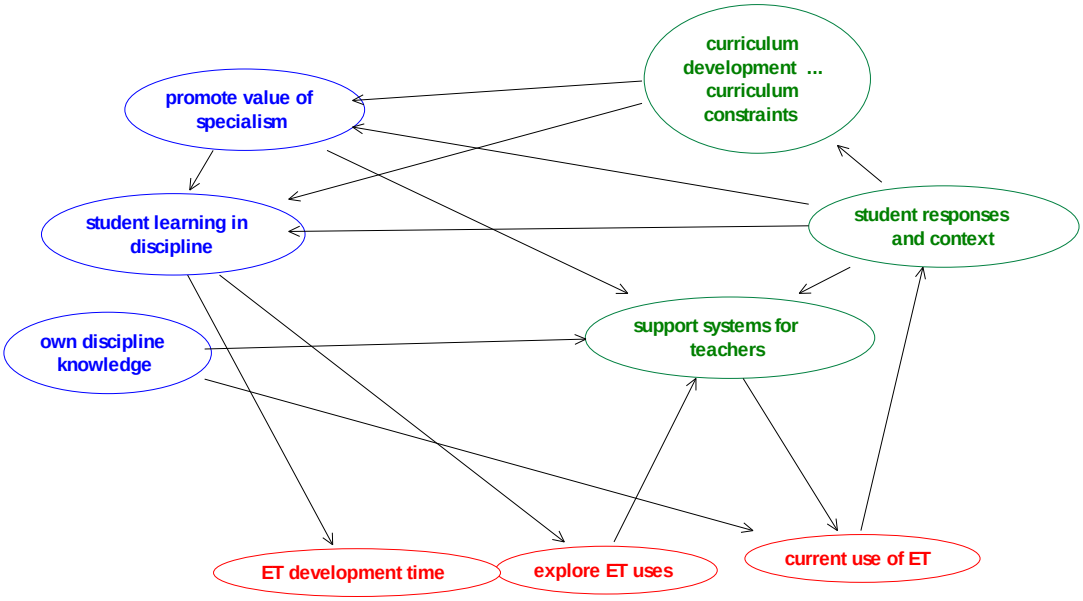


Figure A6.3 Pre-ITET strategy pattern B

Pattern C

Description

There are external industry drivers and professional knowledge needs are changing. Both of these factors link to student learning in the discipline and to curriculum development opportunities and constraints. Student learning in the discipline is associated with use of educational technology to replace lab and field experiences.

Common concepts:

ET to replace lab and field
industry/profession drivers
curriculum development ... constraints
professional knowledge changing

Link pattern:

D and *ET* concepts are not linked.

Occurs in:

Two maps, both from hard applied disciplines (engineering)

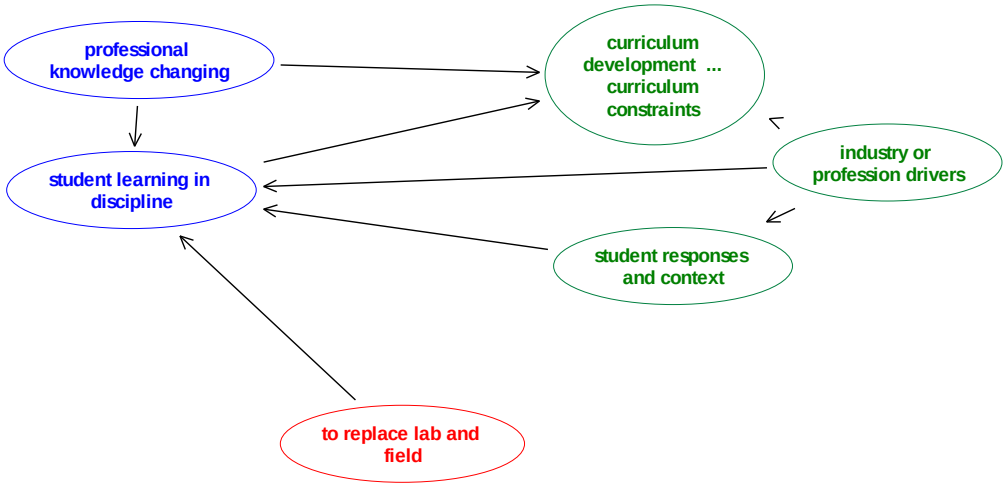


Figure A6.4 Pre-ITET strategy pattern C

Pattern D

Description

The department's service teaching role links with students' learning, which in turn is associated with use of educational technology for student core learning and with discipline-specific educational technology.

Common concepts:

service teaching
current teaching deficient
student learning in discipline
discipline-specific ET needs
ET for students' core learning

Link pattern:

K, *D* and *ET* all linked

Occurs in:

Two maps, both from hard pure disciplines. (maths/science)

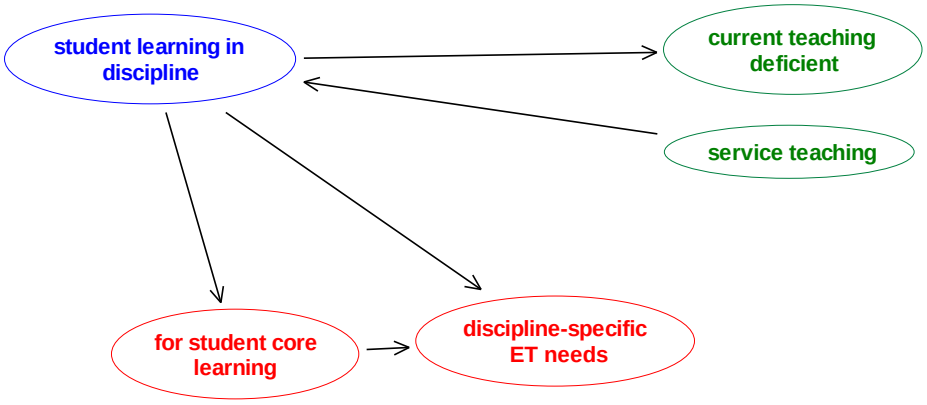


Figure A6.5 Pre-ITET strategy pattern D

Pattern E

Description

Student responses and context are linked to deficiencies in teaching, and the need to use ET to build background skills.

Discipline knowledge is associated with face-to-face discussion, and online learning is related to enhancing classroom activities. Personal interest in ET relates to knowledge of teaching and to a desire to make it more efficient.

Common concepts:

own knowledge of teaching
current teaching deficient

Link pattern:

multiple links from *K* and *D* into *ET*

Occurs in:

Three maps, all from soft applied disciplines (languages and law)

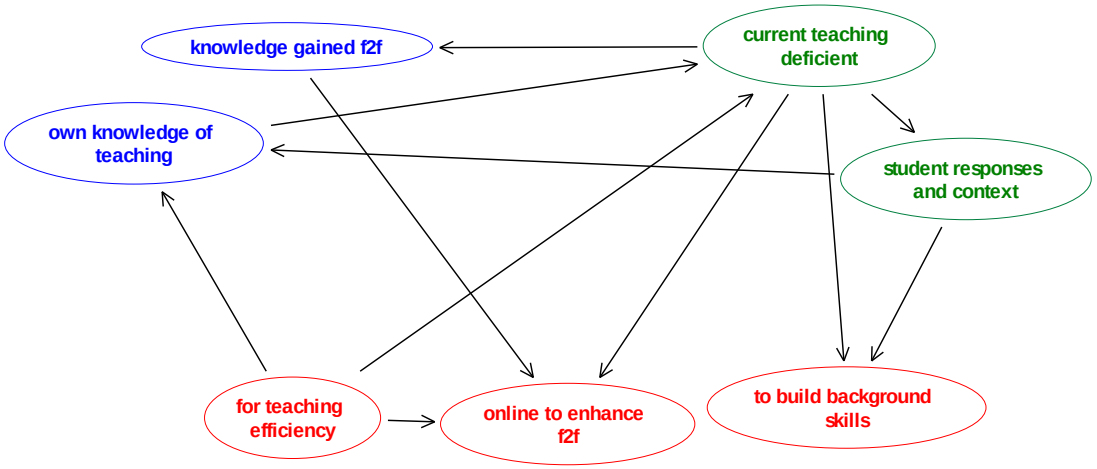


Figure A6.6 Pre-ITET strategy pattern E

Pattern F

Description

Changing professional knowledge is influencing knowledge of teaching. It is also leading to departmental change, and curriculum change to address teaching deficiencies and address student context. ITET and other teaching support systems are part of this.

Common concepts:

professional knowledge changing
own knowledge of teaching
curriculum development ... constraints
(no *ET* concepts at all)

Link pattern:

K concepts linked to *D* concepts, which are heavily interlinked with each other

Occurs in:

Three maps, all from soft applied disciplines (HR and library).

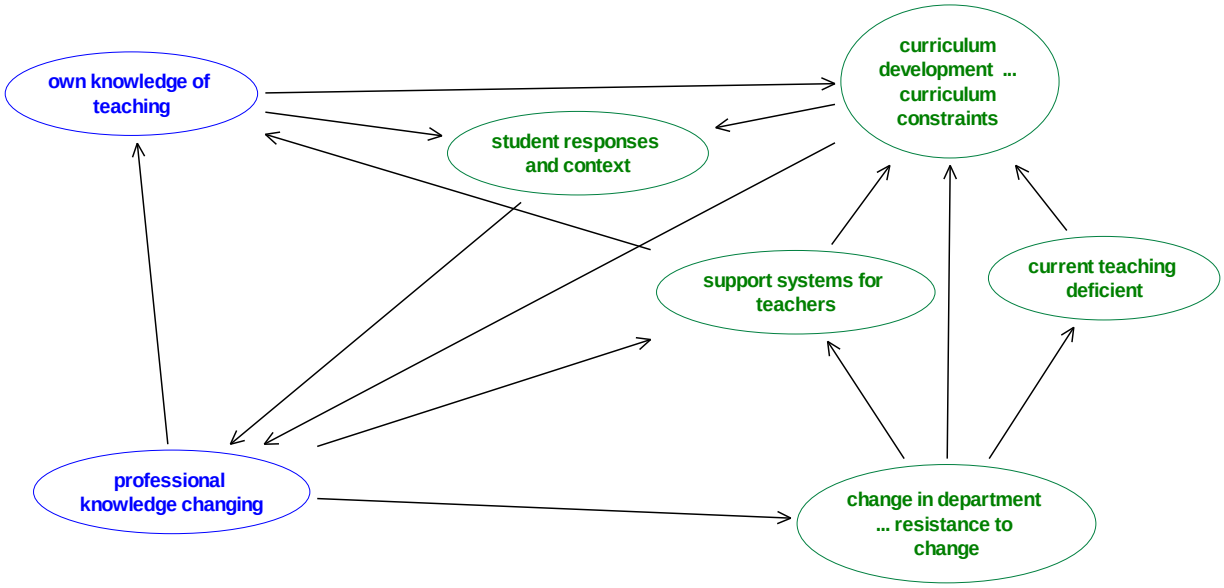


Figure A6.7 Pre-ITET strategy pattern E

Pattern G

Description

Knowledge of teaching links with discipline knowledge and the use of ET as a research tool. There is a need for time for developing teaching.

Common concepts:

own discipline knowledge
time for developing teaching

Link pattern:

no recognisable pattern in the *K-D-ET* links

Occurs in:

Three maps, 2 from soft pure disciplines, 3rd from Art (both soft pure and hard applied)

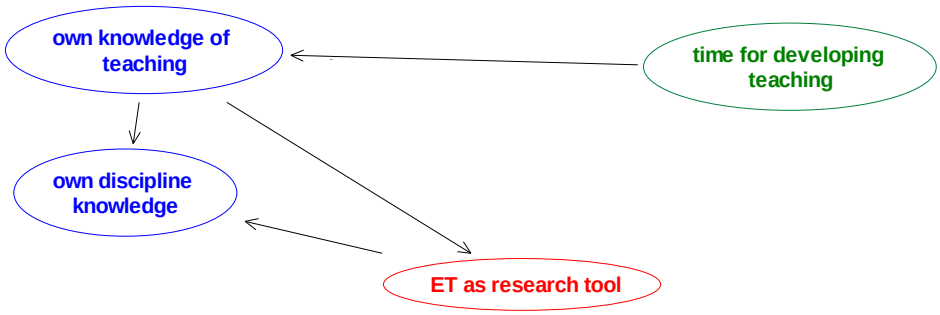


Figure A6.8 Pre-ITET strategy pattern G

Post-ITET discipline patterns

Pattern 1

Description

This strategy focuses on linking use of educational technology into departmental organizational factors, such as curriculum development and arranging time for developing teaching, in which the valuing of research more than teaching is significant.

Time for developing teaching, or rather lack of it, is incompatible with specific media and tools. Sharing of technology with colleagues is linked positively with organizational factors.

Common concepts:
time for developing teaching

Link pattern:

no *D–K* links

Occurs in:

four maps
2 hard applied disciplines, 1 hard pure, 1 soft pure

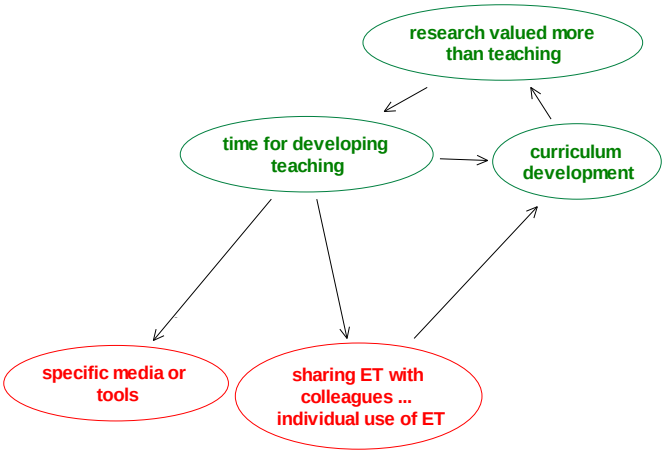


Figure A6.9 Post-ITET strategy pattern 1

Pattern 2

Description

Discipline knowledge, departmental organization and use of educational technology are strongly interdependent.

The use of technology for core student learning links with research in learning and teaching and with support systems for teachers.

Common concepts:
ET for core learning

Link pattern:

many *D–K* links

Occurs in:

six maps
2 hard applied disciplines, 2 soft applied, 1soft pure/hard applied

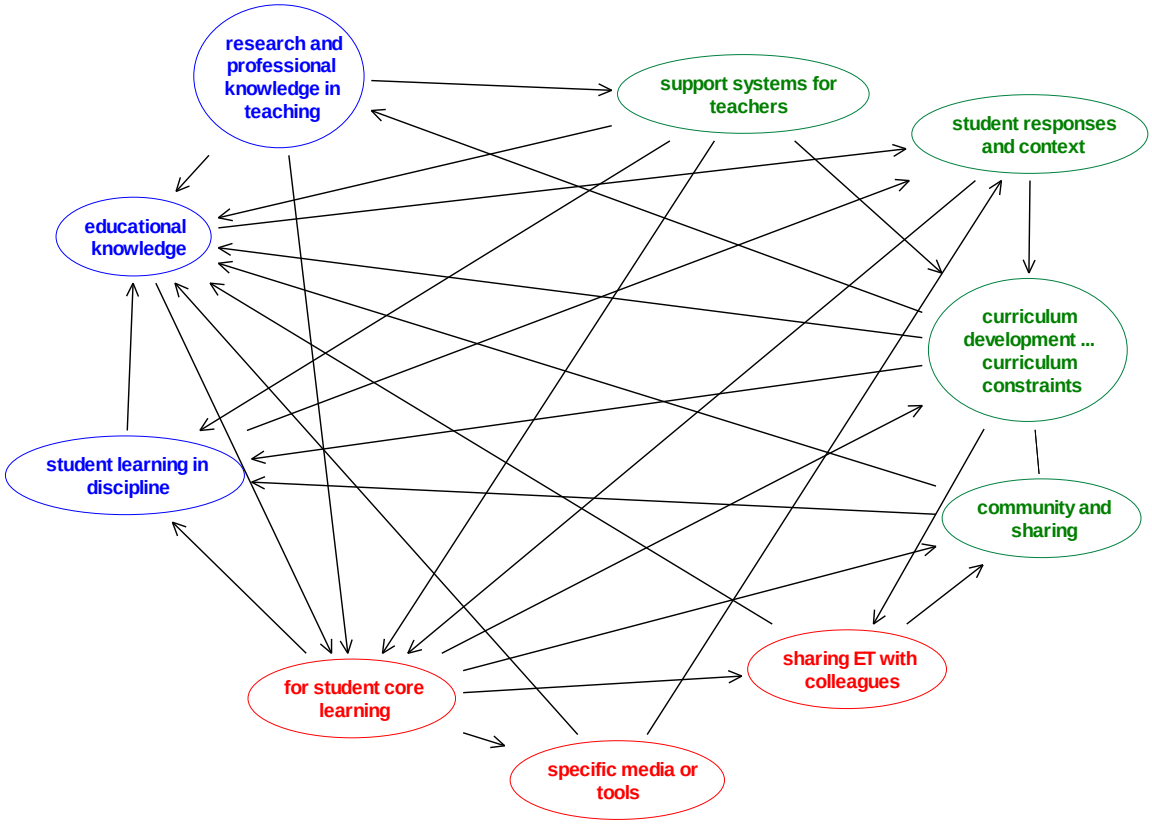


Figure A6.10 Post-ITET strategy pattern 2

Pattern 3

Description

The use of online learning as an enhancement to classroom teaching is linked to a number of different knowledge and organizational factors.

Educational knowledge is linked to many of the same factors, which include curriculum and student issues.

Common concepts:

online for enhancing f2f or for admin info.
educational knowledge

Link pattern:

some D–K links

Occurs in:

four maps
2 soft applied disciplines, 1 hard pure and 1hard applied

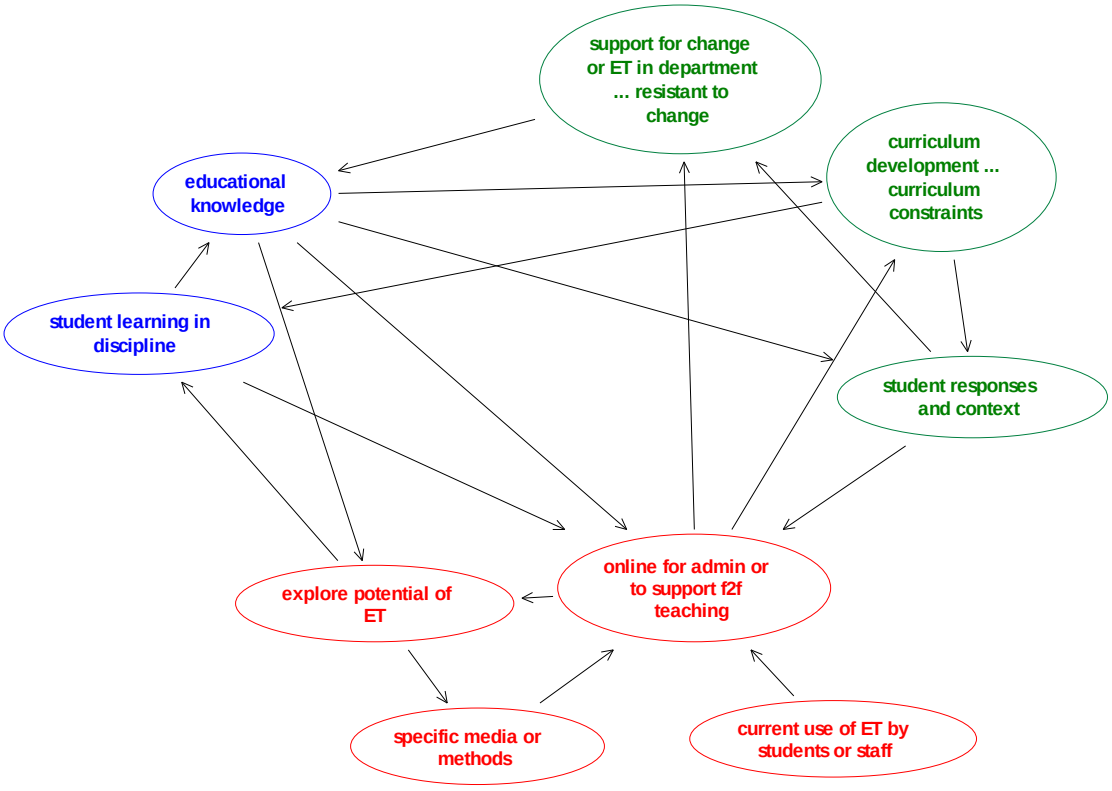


Figure A6.11 Post-ITET strategy pattern 3

Pattern 4

Description

The availability of education technology support staff links via educational knowledge to other factors such as curriculum development, cross-discipline links and use of specific media.

Common concepts:

ET support staff

Link pattern:

some D–K links

Occurs in:

three maps
2 in hard applied disciplines, 1 soft applied

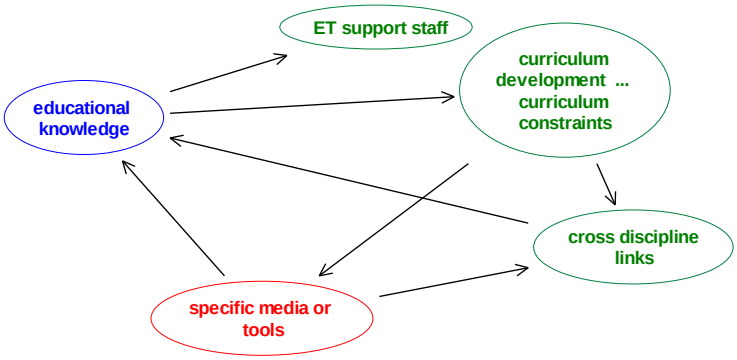


Figure A6.12 Post-ITET strategy pattern 4

Pattern 5

Description

Educational knowledge and changing professional knowledge both link to curriculum development.

All three of these common factors also link with plans for use of specific media or tools, and with cross-discipline links.

Common concepts:

professional knowledge changing
educational knowledge
curriculum development

Link pattern:

D–K links

Occurs in:

four maps
2 in soft applied disciplines, 1 hard applied, 1 soft pure

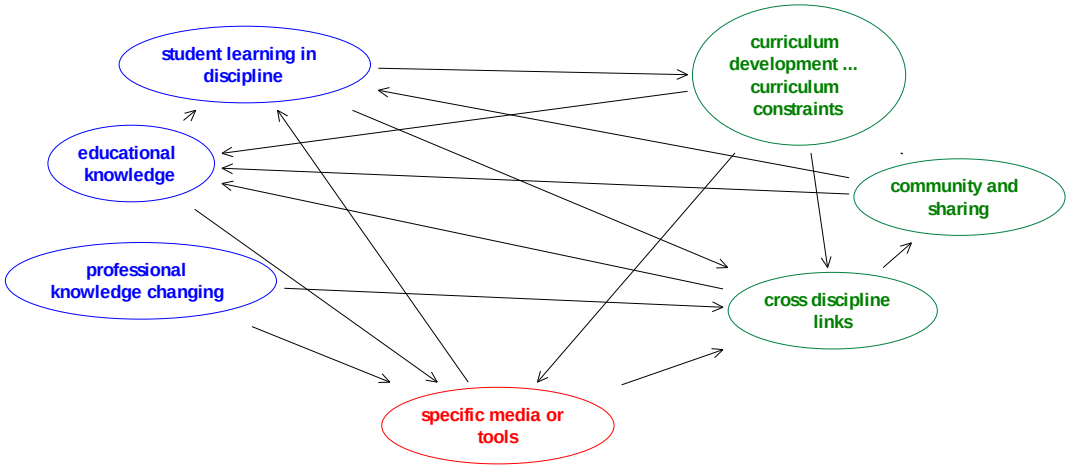


Figure A6.13 Post-ITET strategy pattern 5

Comparison of pre-ITET and post-ITET patterns

The results of a specific search for post-ITET patterns in the pre-ITET maps are in Table A6.1, and pre-ITET patterns in post-ITET maps are listed in Table A6.2.

Table A6.1 Occurrence of post-ITET patterns 1–5 in pre-ITET maps

	linking	common concepts	post-ITET maps	pre-ITET maps
1	no *D–K* links	time for developing teaching	four maps 2 HA, 1 HP, 1 SP	one map SP
2	many *D–K* links	ET for core learning	six maps 2 HA, 2 SA, 1SP/HA	one map HA
3	some *D–K* links	online for enhancing f2f or for admin info. L&T knowledge educational design	four maps 2 SA, 1 HP, 1HA	two maps both SA
4	some *D–K* links	ET support staff	three maps 2 HA, 1 SA	three maps 2 HA and 1 SA
5	*D–K* links	professional knowledge changing L&T knowledge curriculum development	four maps 2 SA, 1 HA, 1SP	three maps 2 SA and 1 HA

HA = hard applied SA = soft applied
HP = hard pure SP = soft pure.

Table A6.2 Occurrence of pre-ITET patterns A–G in post-ITET maps

	linking	common concepts	pre-ITET maps	post-ITET maps
A	*D* concepts linked to *K* and *ET* but not with each other. *ET* interlinked.	IT as part of discipline current use of ET	four maps, all HA	none
B	*K* and *D* concepts link directly to *ET*.	curriculum development ... constraints support systems for teachers current use of ET time to develop ET explore ET uses	three maps, all HA	none
C	*D* and *ET* concepts are not linked.	student learning in discipline professional knowledge changing industry/profession drivers curriculum development ... constraints ET to replace lab and field	two maps, both HA	none
D	*K, D* and *ET* all linked	student learning in discipline service teaching current teaching deficient discipline-specific ET needs ET for students' core learning	two maps, both HP	none
E	multiple links from *K* and *D* into *ET*	own knowledge of teaching current teaching deficient	three maps, all SA	one map, HP
F	*K* linked with *D* and *D* interlinked. No *ET*	professional knowledge changing own knowledge of teaching curriculum development ... constraints	three maps, all SA	one map, HA
G	no recognisable pattern in the *K-D-ET* links	own discipline knowledge time for developing teaching	three maps, two SP and one SP/HA	one map, HP

The post-ITET strategy patterns were all present pre-ITET, and have spread. The pre-ITET discipline-specific patterns have largely disappeared post-ITET. Discipline-specific strategies have been therefore replaced from a larger pool of shared strategies. Post-ITET, some new themes emerge. In particular, the idea of using educational technology for core learning, rather than as an adjunct or support for classroom teaching, has become more prominent.

Persistent and changed topics in individuals' strategies

Another way of estimating the extent of sharing is the way in which topics included in individuals' strategies change between their pre-ITET and post-ITET maps.

Persistent topics

The following topics persisted in more than 25% of the Fellows, and occurred across discipline types:

learning and teaching knowledge	11 people
curriculum development ... constraints	8 people
student learning	5 people

New topics

The following appeared as new topics post-ITET, and were not present pre-ITET:

educational design	13 people
cross-discipline links	9 people
community and sharing	5 people
institutional educational technology provision	5 people
online activities	5 people
use of discipline research in teaching	4 people
educational technology for admin. information	4 people
media	4 people
use professional sources in teaching	2 people

Ideas that spread

The following topics from the pre-ITET maps were taken up by other people post-ITET:

Topic	pre-ITET	spread post-ITET
curriculum development ... constraints	9 people	7 more people
time for developing teaching	5 people	6 more people
educational technology for core learning	4 people	6 more people
learning and teaching knowledge	13 people	5 more people
discipline knowledge	8 people	5 more people
student learning	12 people	4 more people
student context	13 people	4 more people
departmental change	7 people	4 more people
sharing ET	3 people	4 more people
digital resources	1 people	4 more people
teaching support	5 people	3 more people
funding	2 people	3 more people
educational technology support	3 people	3 more people
ET for distance/ postgrad taught programs	3 people	3 more people
current use of ET	9 people	3 more people
ET as potential/opportunity	6 people	3 more people
professional knowledge change	6 people	2 more people
promote value of specialism	4 people	2 more people

Topic	pre-ITET	spread post-ITET
teaching deficiencies	10 people	2 more people
industry needs	3 people	2 more people
resistance to use of ed. technology	6 people	2 more people
ET to enhance classroom learning	4 people	2 more people
development time for ET	3 people	1 more people

Ideas that did not spread

The ideas that had not spread post-ITET were all related to educational technology:

use technology to improve efficiency in teaching

individual use of technology (as distinct from sharing resources)

technology as a research tool

discipline-specific uses of technology.

Appendix 7: Results of map analysis for individual and team orientation

To assess the participants strategies in terms of individual or team orientation to teaching work and use of educational technologies, I looked for patterns in the links between department, individual and educational technology, as shown in Figure A7.1, using the same process as for the discipline analysis. Two sets of results are presented.

Pre-ITET patterns: I identified five pattern groups, labelled H–L. For each of these a general description of the pattern is followed by a list of common characteristics and a merged cognitive map of the strategy pattern.

One pre-ITET map had the link pattern of group H and the concept pattern of group I. This was assigned to group I. The other 18 pre-ITET maps have both the link and the concept pattern of the group to which they were assigned.

Post-ITET patterns: I identified four pattern groups, labelled 6–9. For each of these a general description of the pattern is followed by a list of common characteristics and a merged cognitive map of the strategy pattern.

Two of the post-ITET maps had the link pattern of group 6 and the concept pattern of group 7. These were both assigned to group 7. The other 17 maps have both the link and concept patterns of the groups to which they are assigned.

Note that in the merged summary maps for each strategy pattern, only the linking between topics is significant. The direction of the arrows does not imply any causal or influence pattern.

The common concept topics listed occur in all the maps in the group. The merged maps show other concept topics linked to the common topics in more than one of the group.

The academic disciplines represented in each group are also listed, using the following abbreviations:

HA = hard applied SA = soft applied
HP = hard pure SP = soft pure.

No discipline alignment is evident in the pattern groups.

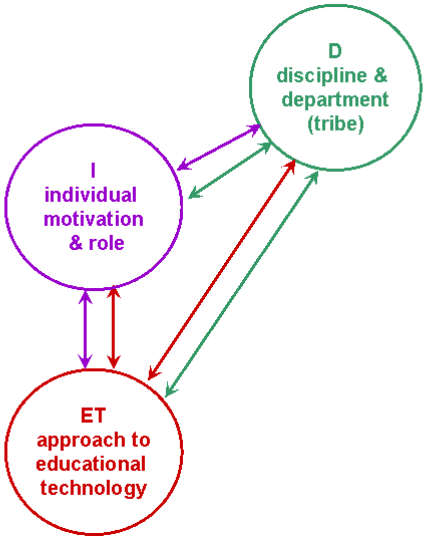


Figure A7.1

Pattern groups pre-ITET

Pattern H

Description

The individual has both a strong personal motivation and role related to existing use of educational technology and/or developing its potential. Both educational technology use and individual motivation are strongly linked with departmental contexts in which time and support for addressing student needs and teaching deficiencies are also related to departmental research focus.

Common concepts:

individual role or values
personal interest or experience
current or potential use of ET

Link pattern: highly linked, all ways

Occurs in: seven maps
4 HA, 1 SP, 1 SA, 1 SP

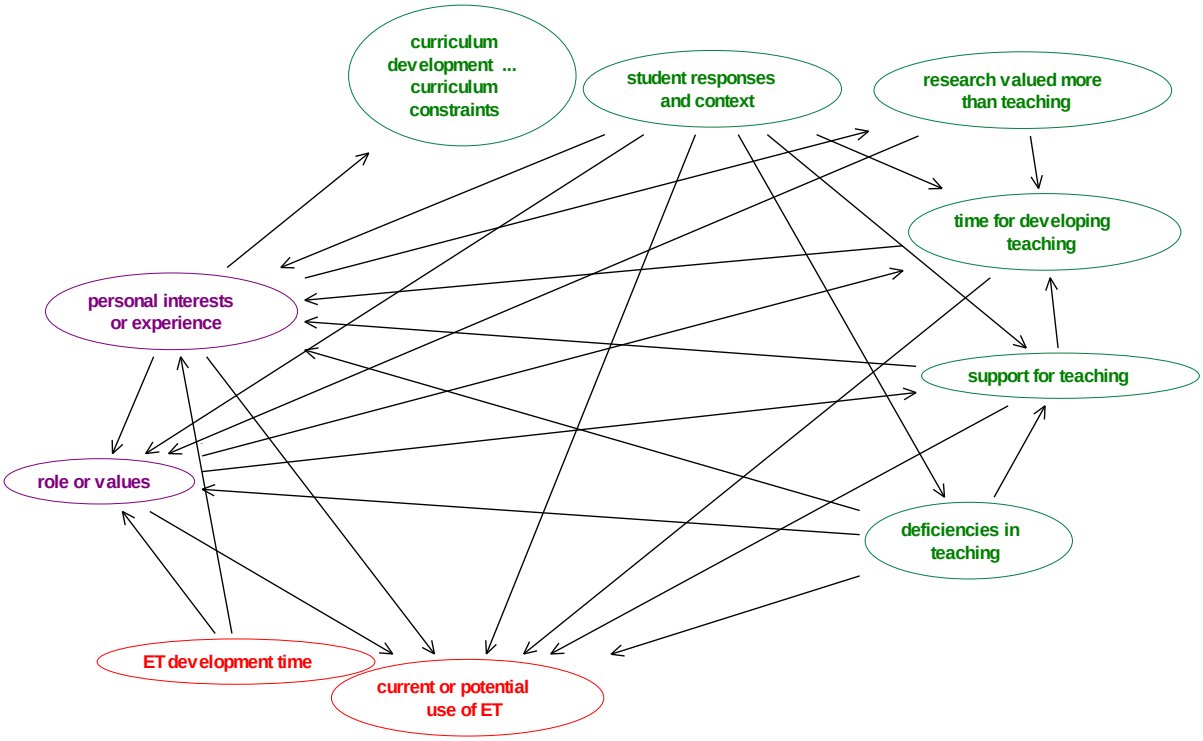


Figure A7.2 Pre-ITET pattern H

Pattern I

Description

Individual experience and interest is linked to a tension between individual use and shared use of educational technology and dealing with departmental resistance. There is interest in using specific media or tools and in using technology to improve efficiency.

Common concepts:

personal interest or experience

Link pattern: linked in at least 2 ways

Occurs in: four maps
2 SA, 1 SP, 1 HA

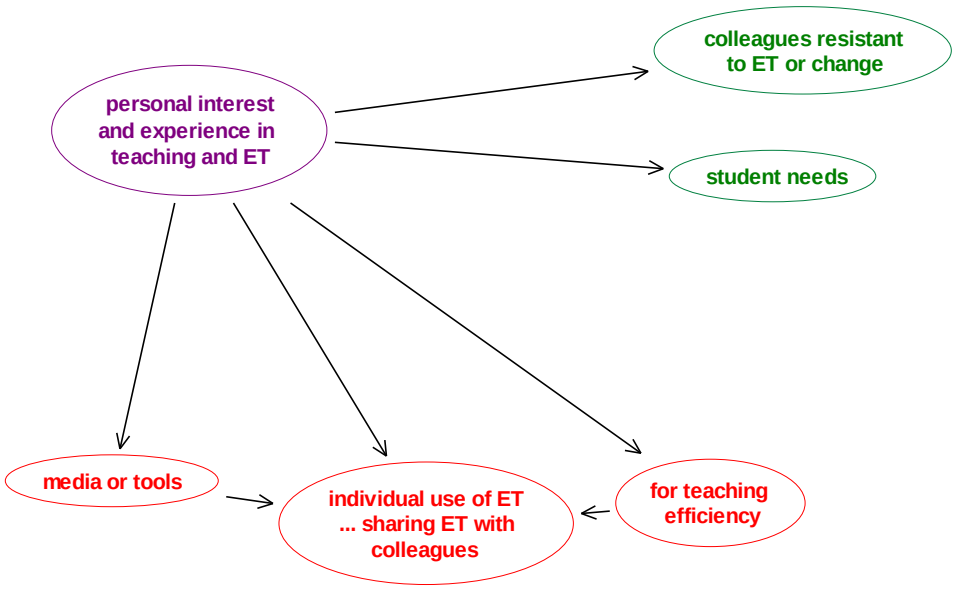


Figure A7.3 **Pre-ITET pattern I**

Pattern J

Description

The only common factors here are current use of ET and acknowledgement of student needs – specifically diversity. No specific strategies are evident.

Common concepts:

student diversity
class sizes or funding
current use of ET

Link pattern: *D–ET* links only

Occurs in: two maps
1 HA, 1 HP

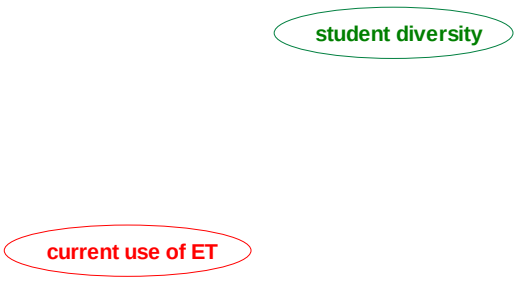


Figure A7.4 **Pre-ITET pattern J**

Pattern K

Description

An interest in teaching and a formal role in the School or department interact in relation to curriculum development to address deficiencies in meeting student learning student needs. No specific education technology strategy is articulated.

Common concepts:

individual role

Link pattern: I–*D* links only

Occurs in: three maps
1 SA, 1 HA,1 SP/HA

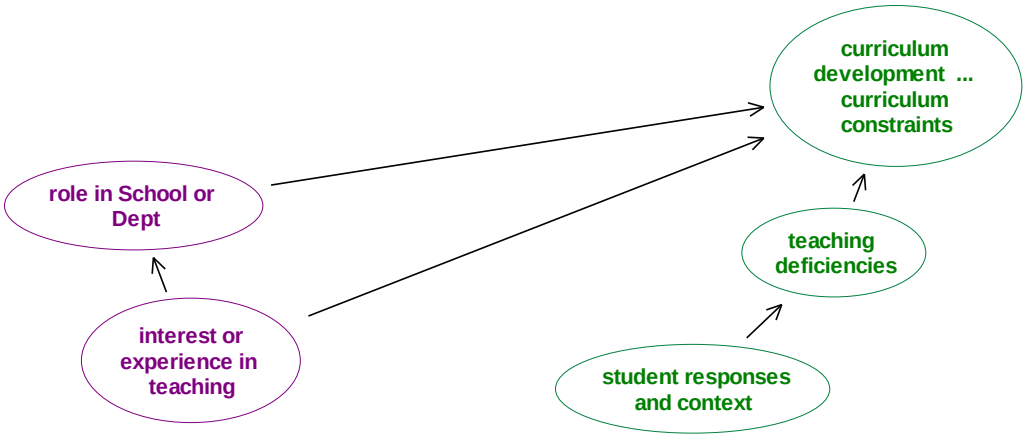


Figure A7.5 Pre-ITET pattern K

Pattern L

Description

There is concern to develop the curriculum in relation to student and industry needs, but no educational strategy for doing this.

Common concepts:

student needs
curriculum

Link pattern: no links between groups

Occurs in: three maps – 2 SA, 1 HA

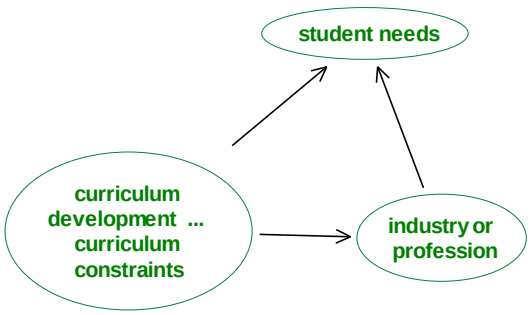


Figure A7.6 Pre-ITET pattern L

Pattern groups post-ITET

Pattern 6

Description

In a context where time for developing teaching is an issue, related to research being valued more than teaching, individuals who have a role in curriculum development are planning their own work accordingly. External recognition of teaching is also related to the valuing of research.

Common concepts:

role
own work planning
time
curriculum

Link pattern: highly linked, all ways

Occurs in: three maps
2 HA, 1 SA

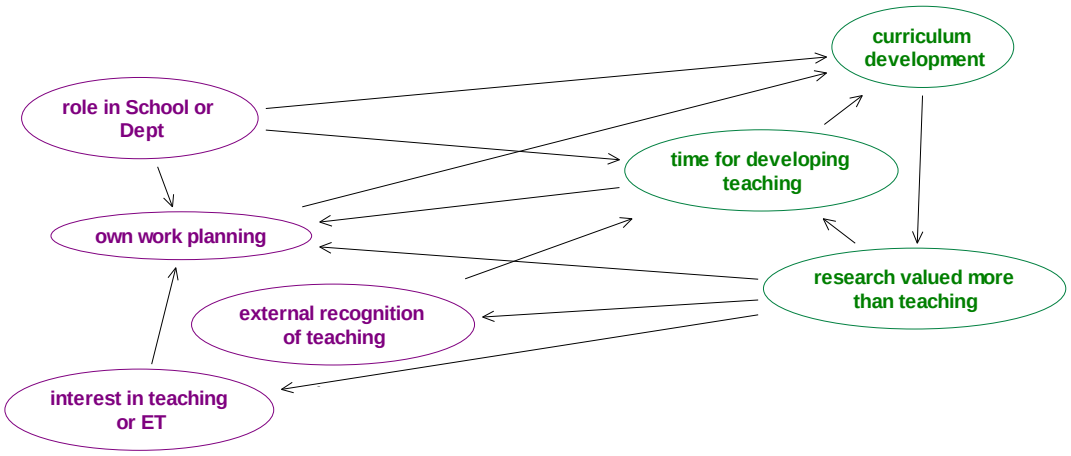


Figure A7.7 Post-ITET pattern 6

Pattern 7

Description

Where there is concern about meeting student needs, there is related recognition of interdependence between curriculum development or departmental change and the accompanying constraints or change resistance in the department. In this context, educational technology can help meet student needs through use of specific tools or media, use for administration and information transfer, or to meet distance or postgraduate study. Some individuals are developing roles or seeking external recognition of teaching as part of their strategy for addressing student needs.

Common concepts:

student needs
curriculum

Link pattern: links in at least two directions

Occurs in: six maps
2 SA, 1 HA, 1 HP, 1 HA, 1 SP/HA

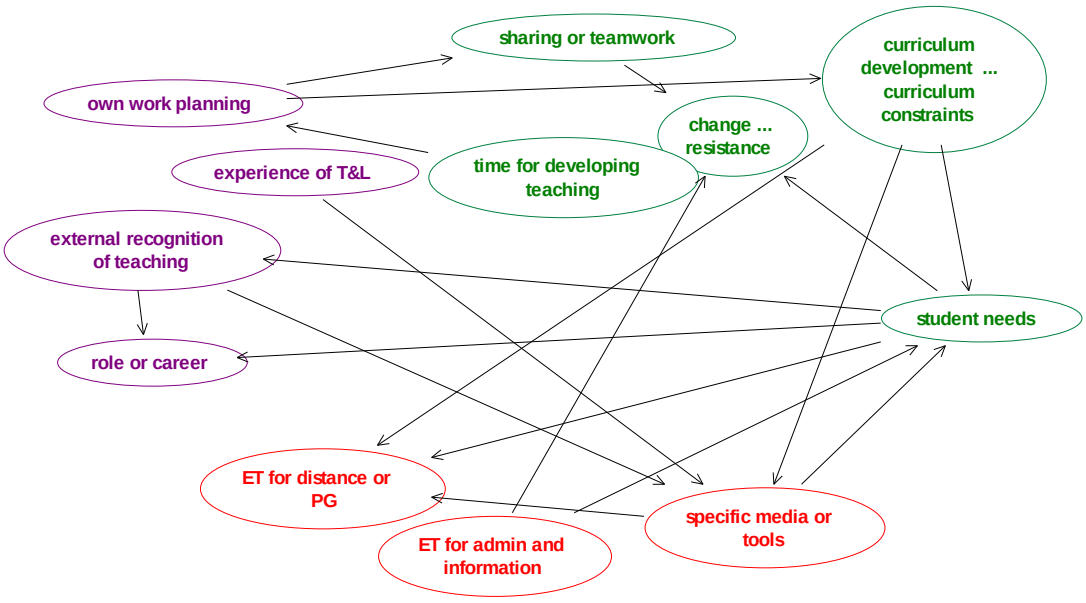


Figure A7.8 Post-ITET pattern 7

Pattern 8

Description

Strategies involving sharing and cross-discipline links relate these community activities to curriculum development and support for teaching, and sometimes also to their own role in the department or to external recognition of teaching. Where this is linked to use of educational technology, it is in relation to use for core learning, or to sharing of resources.

Common concepts:

x-discipline links
sharing

Link pattern: *I–ET* or *I–D* links

Occurs in: five maps
3 HA, 2 SA

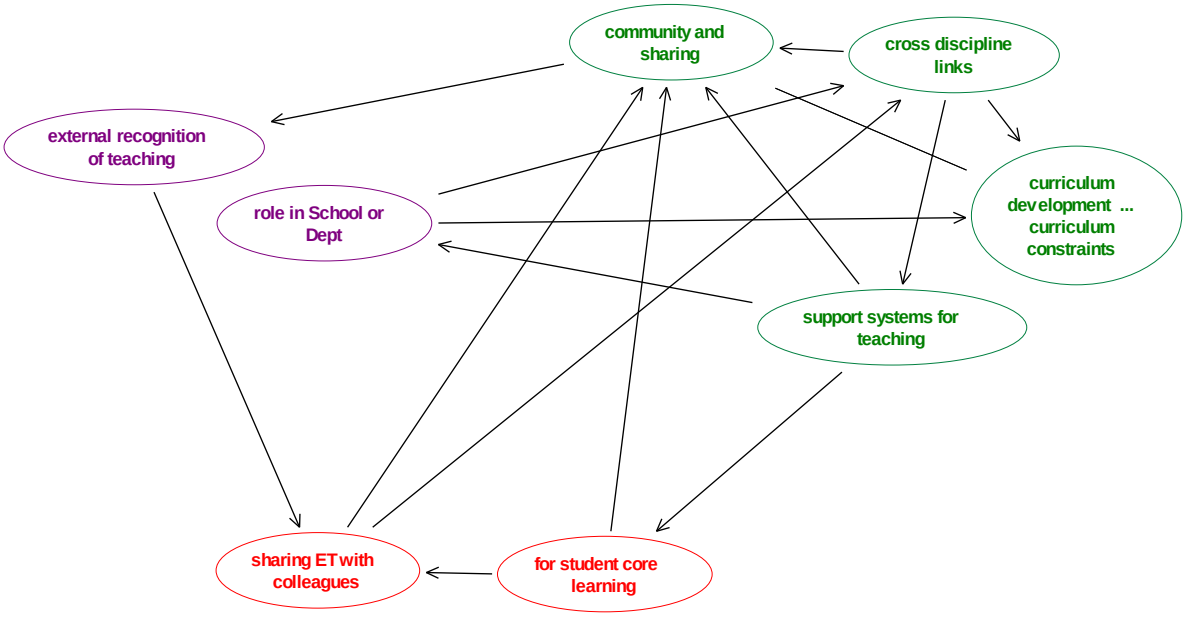


Figure A7.9 Post-ITET pattern 8

Pattern 9

Description

Those who do not articulate any individual component to their strategy tend to focus on using specific technologies for supporting core student learning, in order to meet student needs. The time available for developing teaching is a constraint on this, and cross-discipline links may help.

Common concepts:

use of specific media tools or institutional systems

Link pattern: *D–ET* links only
no *I* concepts

Occurs in: five maps
2 HA, 2 SA, 1 HP

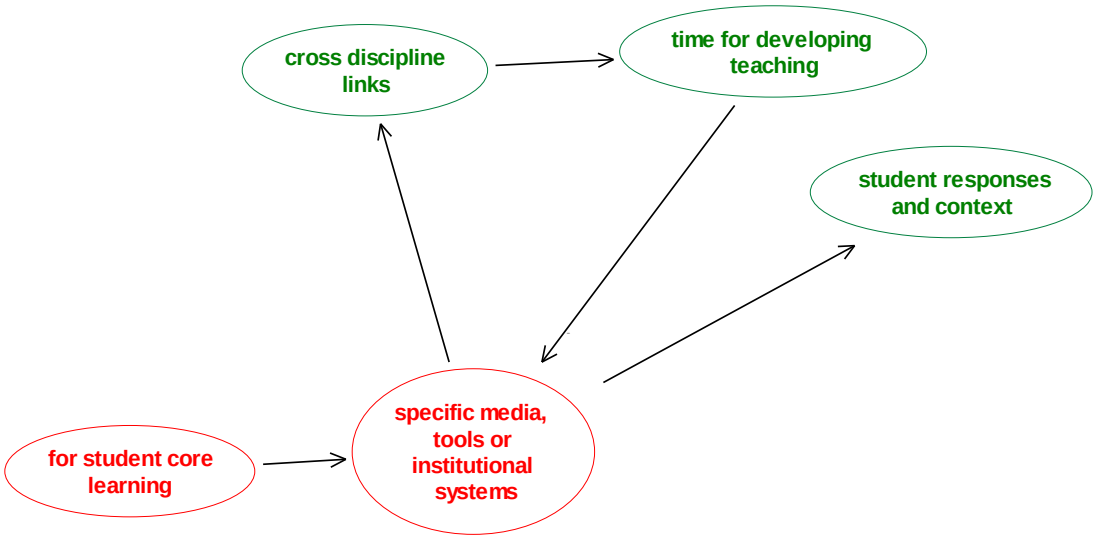


Figure A7.10 Post-ITET pattern 9

Appendix 8: Results of recoded map analysis for empowerment

The analysis for empowerment focuses on whether individuals represents their actions and capabilities as having influence over, or being influenced by the environment. The analysis of the recoded maps for the direction of influence between *I* concepts and the three other concept categories (Figure A8.1.)

Five of the 19 pre-ITET maps have no *I* concepts and therefore cannot contribute to this part of the analysis. Similarly five of the post-ITET maps (from different individuals) have no *I* concepts and are not included.

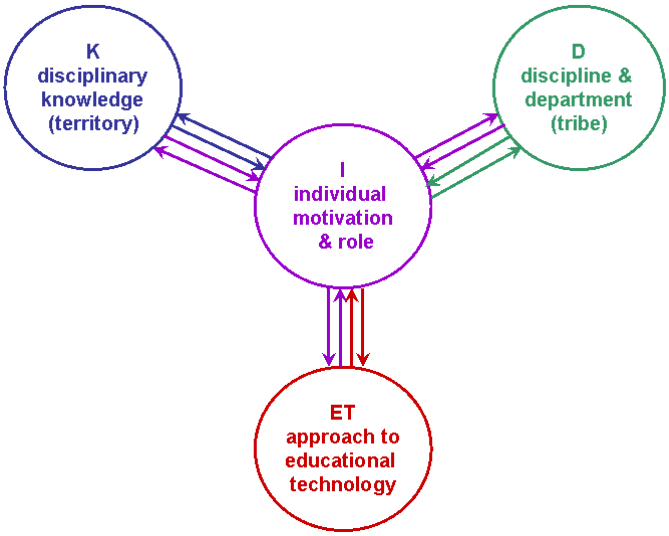


Figure A8.1

The results include:

1. analysis of the distribution across the group of a general perception of individual influence, using a net influence score derived from the net direction of influences to and from the individual in the maps
2. the content of the different topics in the *I* concepts influencing and being influenced by *K, D* and *ET* concepts, and the direction and strength of these influences
3. the content of different topics in each of the *K, D* and *ET* concept categories influencing the *I* concepts, and the direction and strength of these influences.

The results are presented as a comparison between the pre-ITET maps and the post-ITET maps. The influence of the ITET programme itself has been removed, because it biases the results. In the pre-ITET maps, where ITET appears it is as a decision by the individual to do the Fellowship, and therefore gives bias towards positive influence from the individual. Similarly, several of the post-ITET maps reflect the impact of the ITET experience on the individual, and therefore bias the score towards external influence upon the individual.

In this analysis I did not attempt to identify different pattern groups as for discipline and teamwork themes, for a number of reasons. Firstly, the direction of perceived influences is significant in empowerment. As noted in Chapter 4, examining directions separately means looking for patterns in 12 different types of link simultaneously. Secondly, since 10 of the 38 maps had no *I* concepts, the data set was reduced to 14 pre-ITET and 14 post-ITET maps. Patterns in 12 different link types across only 14 maps would be both hard to identify reliably and hard to validate. Finally, even if strategy pattern groups could be identified, it is not possible to produce meaningful merged maps to represent each group's strategy, since link direction information is destroyed in the merging process. For all of these reasons I examined only the combined characteristics of the 14 pre-ITET maps and compared them with the combined characteristics of the 14 post-ITET maps.

Comparison of individuals

Recoded pre-ITET maps

The scores plotted in Figure A8.2 are derived by counting +1 for each link showing individual influence upon other concept categories and –1 for influence upon the individual. The resulting scores ranged from –10 to +10; indicating that that individuals entering the Fellowship programme vary widely in the extent to which they feel able to influence their environment. The preponderance of positive scores in the group as a whole indicates that the Fellows are beginning the programme feeling, on average, that they can make a difference.

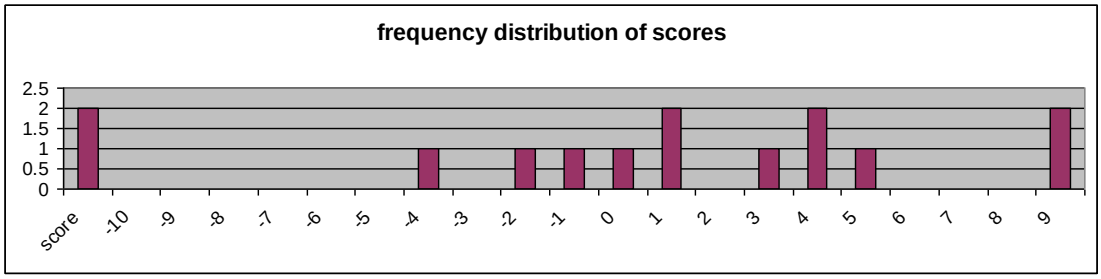


Figure A8.2 Pre-ITET individual perception of overall influence

Recoded post-ITET maps

The distribution pattern in Figure A8.3 is similar to that for the pre-ITET maps, ranging from –7 to +11, with a preponderance of positive scores for the group as a whole, as for the pre-ITET maps.

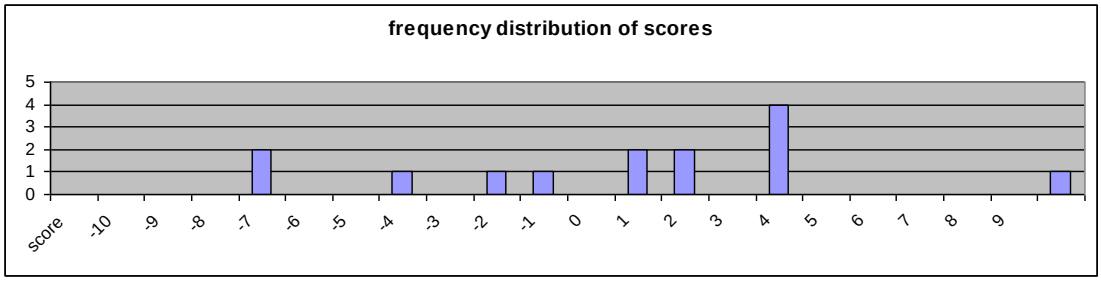


Figure A8.3 Post-ITET individual perception of overall influence

Net influence of *I* concepts in relation to *K, D* and *ET* concepts

The results are presented as a net influence score for each concept topic. The net influence is the number of *I* concepts on that topic with influence upon external (*K, D* and *ET)* concepts minus the number influenced by external concepts. A positive score therefore indicates that the topic is a net source of influence for individual teachers. A negative score indicates that the topic represents where individual teacher strategies are driven or constrained by their environment. Only topics occurring in more than one map have been included.

Recoded pre-ITET maps

Table A8.1 lists the pre-ITET results. Figure A8.4 shows the results in the form of a summary map for the pre-ITET strategies, with the arrows representing the directions and strengths of net influences. (Grey arrows and numbers indicate strength and direction of net influence. Blue arrows indicate presence of mutual influence.)

An interest in educational technology, personal values, current roles in the department, along with interest in, and experiences of teaching and learning, are all significant intrinsic motivators. Factors which have a net negative score (i.e. are more of a response to the environment than an influence upon it) are career interests and planning of workload.

Table A8.1 Influential / concept topics pre-ITET

concept topic	with influence	influenced	net influence score
interest in ET	15	7	8
values or characteristics	10	4	6
role in School or Dept	11	7	4
interest in teaching	12	9	3
experience of T&L	12	10	2
career interest	1	3	-2
own work planning	2	4	-2

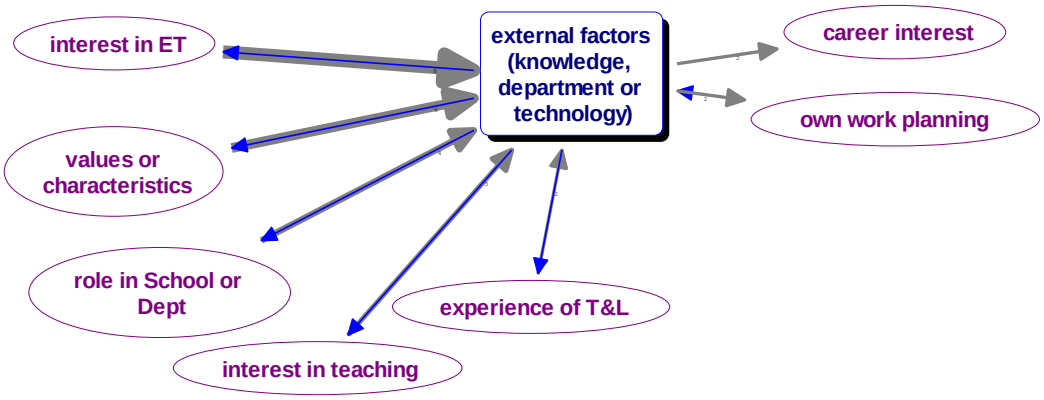


Figure A8.4 Pre-ITET individual factors influencing, and influenced by external factors

Recoded post-ITET maps

Table A8.2 lists the post-ITET results and Figure A8.5 shows a summary map for the post-ITET strategies.

The most noticeable change from the pre-ITET maps is the presence of a strong mutual influence between the individual and external recognition of teaching. Role in the department and intrinsic interests in teaching with technology are similar to the pre-ITET maps, although the latter is now a weaker as a mutual influence. Conversely, work planning has become a stronger mutual influence – an indication that intrinsic interest has been followed through into action.

Table A8.2 Influential / concept topics post-ITET

concept group	with influence	influenced	net influence score
values or characteristics	4		4
role in School or Dept	10	7	3
interest in teaching	4	1	3
experience of T&L	3		3
interest in ET	4	2	2
external recognition of teaching	10	10	0
career interest	1	1	0
own work planning	10	11	-1

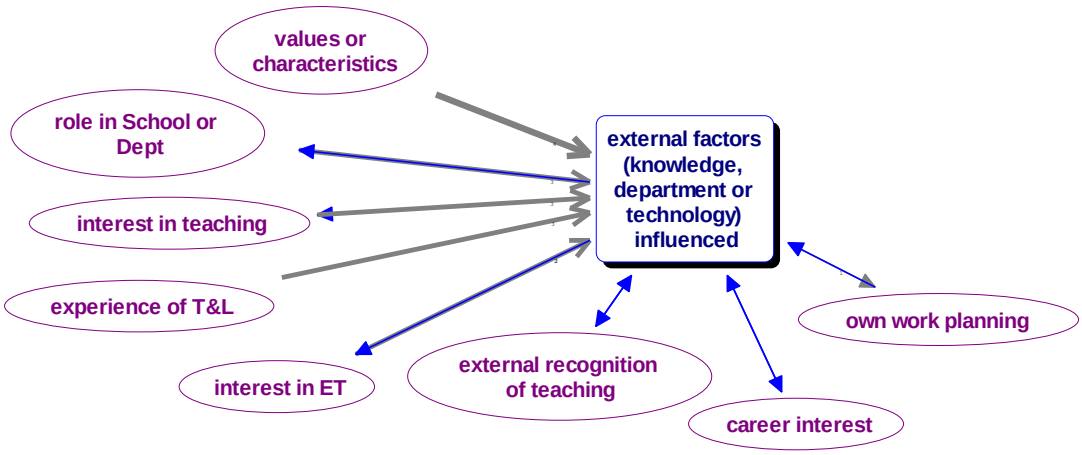


Figure A8.5 Post-ITET individual factors influencing, and influenced by external factors

Net influence of *K, D* and *ET* concepts in relation to *I* concepts

The results are presented as a net influence score for each *K, D* and *ET* concept topic. The net influence is the number of concepts on that topic which are directly influenced by the individual (*I*) concepts minus the number that have influence upon *I* concepts. A positive score therefore indicates that the topic is something individual teachers feel they can influence. A negative score indicates that the topic is something that drives or constrains individual teachers' strategies. Again, only topics occurring in more than one map have been included.

Table A8.3 lists the pre-ITET results and Table A8.4 lists the post-ITET results. Overall, it is noticeable that organizational and departmental concepts predominate. But the departmental influence is in proportion with the overall number of *D* concepts in compared with *K* and *ET* concepts in the maps, which is approximately 40% to 25% and 20% respectively, both pre-ITET and post-ITET maps. Organizational concepts therefore feature strongly in the teacher strategies, before and after ITET, and the influence goes both ways.

Below are these results are described and represented diagrammatically, for each of the *K, D and ET* concept categories.

Table A8.3 Individual influence by *K, D* and *ET* concept topics pre-ITET

concepts	influenced by individual	influencing individual	net influence score
L&T knowledge	7	3	4
student learning in discipline	4	3	1
discipline or professional knowledge	4	4	0
curriculum development… constraints	5	1	4
industry or profession needs	2	0	2
support systems for teachers	4	3	1
student responses and context	1	2	-1
research valued more than teaching	2	3	-1
change in department… resistance	3	4	-1
time and money for teaching	1	3	-2
teaching deficiencies	0	3	-3
ET for learning support	3	0	3
individual use of ET	2	0	2
use current IT in teaching	1	1	0
ET development time	0	3	-3

Table A8.4 Individual influence by *K, D* and *ET* concept topics post-ITET

concept group	influenced by individual	influencing individual	net influence score
L&T knowledge	10	2	8
student learning in discipline	2	0	2
curriculum development … constraints	7	4	3
community and sharing	4	2	2
cross-discipline links	2	1	1
support systems for teachers	1	1	0
time and money for teaching	6	7	-1
research valued more	0	2	-2
student responses and context	1	3	-2
learning resources and objects	5		5
sharing ET with colleagues	3	3	-1

Knowledge factors

The pre-ITET results show that individual teachers are able to influence their own knowledge of teaching and that discipline/professional knowledge is a mutual influence. See Figure A8.6.

Post-ITET, as in the pre-ITET maps, knowledge of learning and teaching, and student learning in the discipline are still shown as something the individual teacher can influence. However discipline knowledge is no longer a significant mutual influence. See Figure A8.7.

Departmental and organizational factors

In the pre-ITET maps, the individual teacher has a net influence upon curriculum, on industry or professional needs and on support systems for teachers. Post-ITET, the influence on curriculum development is still there. New factors associated with individual teacher influence post-ITET include community and sharing and cross-discipline links. See Figures A8.8 and A8.9.

The valuing of research rather than teaching is a net influence upon the individual, both before and after ITET. The time and resources available for teaching are also a persistent influence but become a stronger mutual influence for the individual. This suggests that organizing time and resources has become part of active teacher strategies rather than being viewed as solely a constraint.

Educational technology

Pre-ITET, the balance of influence from individuals is related to individual use of educational technology, mainly for learning support. The time taken to develop educational technology is a net influence upon the individual.

Post-ITET, the maps show individual influence upon learning objects and resources, and a mutual influence upon sharing of educational technology with colleagues.

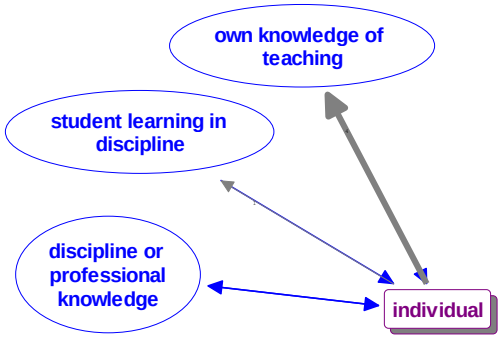


Figure A8.6 Individual teacher influence on knowledge, pre-ITET

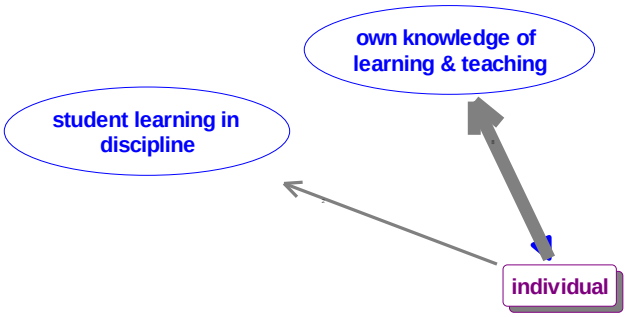


Figure A8.7 Net individual teacher influence on knowledge, post-ITET

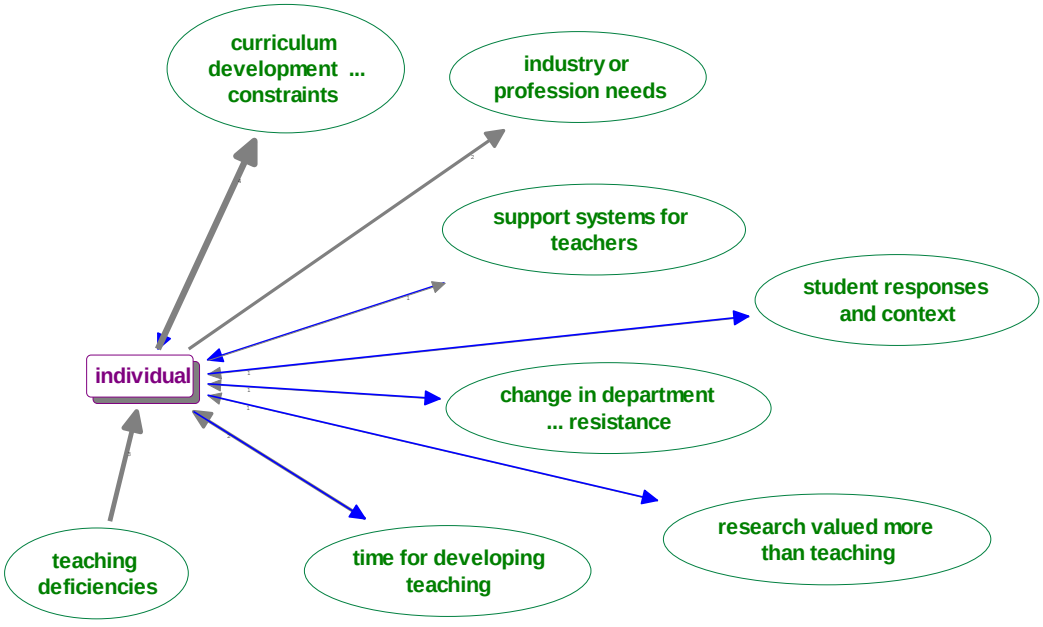


Figure A8.8 Individual teacher influence on department and organization, pre-ITET

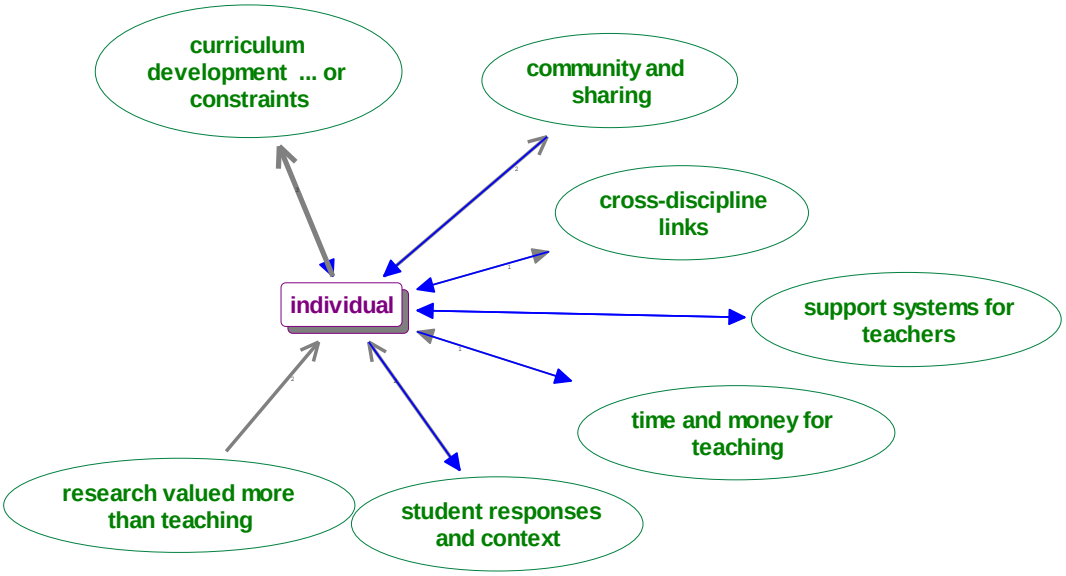


Figure A8.9 **Individual teacher influence on department and organization, post-ITET**

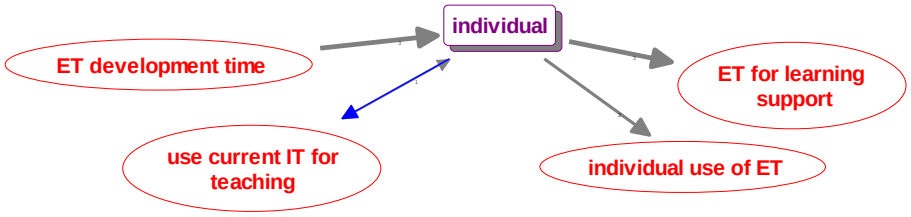


Figure A8.10 **Individual teacher influence on educational technology, pre-ITET**

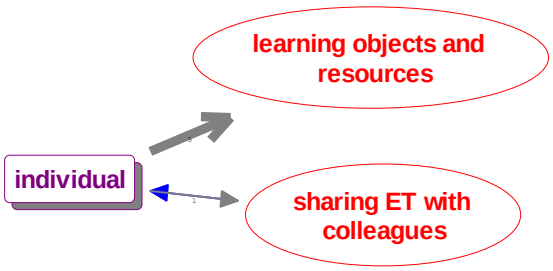


Figure A8.11 **Individual teacher influence on educational technology, post-ITET**

Appendix 9: Results of analysis of maps as originally coded by the participants

This analysis examined the maps with the participants' original coding. The patterns in the analysis relate both to empowerment and to beliefs or values:

1. an overview of the numbers of concepts coded as actions, capabilities, beliefs-values and environment
2. the directional balance of influence between these categories, as follows:
   actions and capabilities
   environment and capabilities
   environment and beliefs-values
   environment and actions
   beliefs-values and actions
   beliefs-values and capabilities.
3. the topics of the concepts identified as beliefs or values, as summarized using the same NVIVO nodes as in the analysis of recoded maps discipline and teamwork patterns.

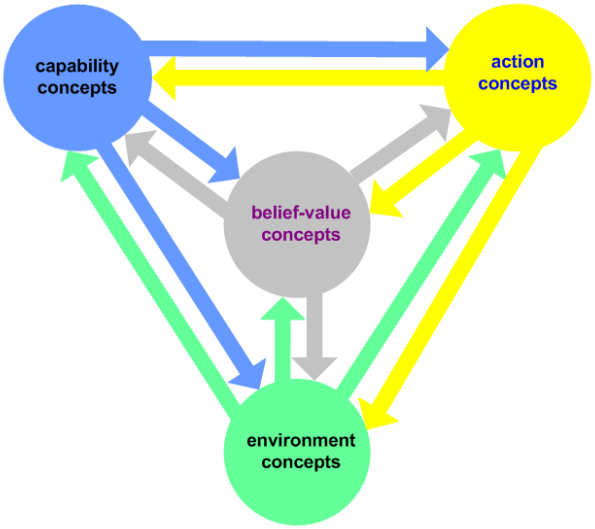


Figure A9.1

Overview of concept distribution and links

Figurea A9.2 and A9.3 show an overview of the distribution of concepts and links.
The weight of the arrows is a rough indication of the net direction and strength of influence.

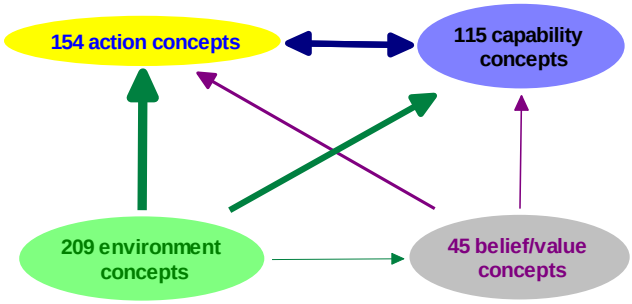


Figure A9.2 Pre-ITET concept counts for each category

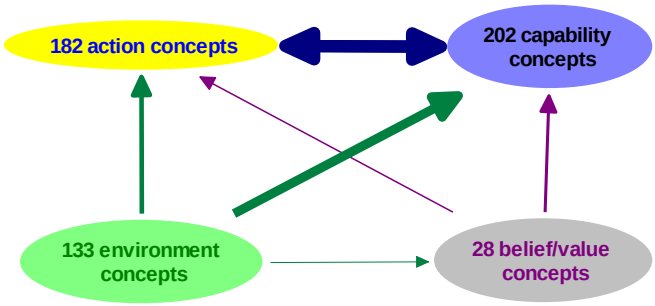


Figure A9.2 Post-ITET concept counts for each category

Post-ITET, significantly fewer concepts are identified as beliefs-values and as environment than pre-ITET and more are identified as actions and capabilities. This gives a general indication that the Fellows, overall have more proactive strategies after participation in the Fellowship programme.

Balance of influence between categories

Figures A9.3–A9.8 show the influence links in more detail. The numbers (and %) within the arrows are the concepts in that category influencing the other category. Those at the arrowhead are those influenced by the other category. Percentages are to the nearest 5%

Influence between action and capability concepts

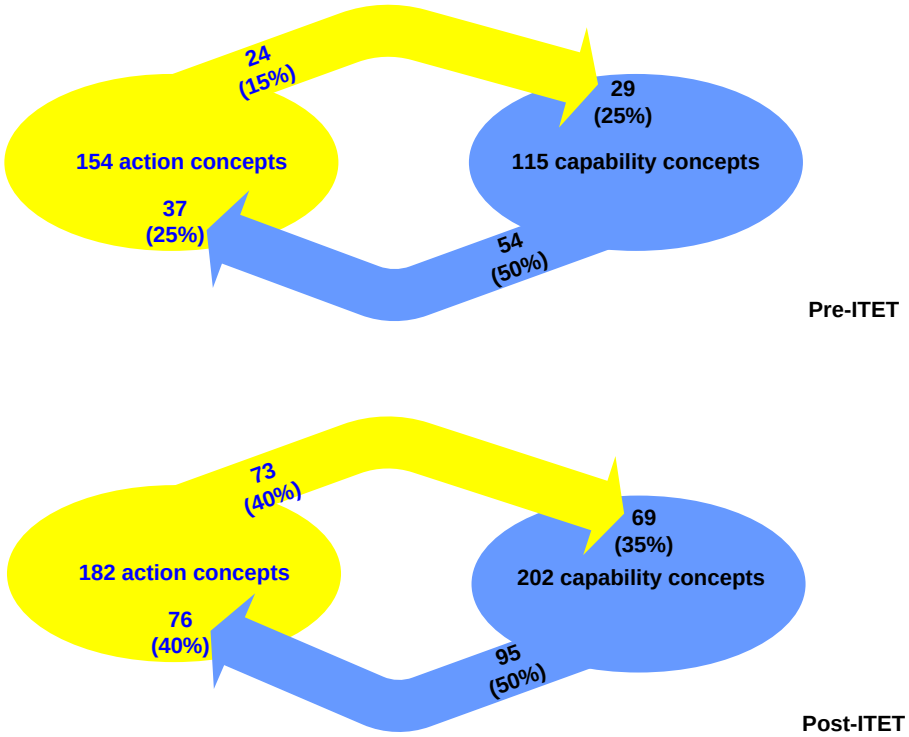


Figure A9.3. Influence between action and capability concepts

In Figure A9.4, whereas the proportion of capability concepts influencing actions has remained constant at 50%, the influence in the other direction has increased from 15-25% to 35-40%. In other words, the strategies now include more actions to change capabilities, which in turn are able to influence further action – a positive feedback pattern that has increased the overall number of capabilities and actions in the strategies.

The increase in action concepts, and particularly in actions affecting capabilities, indicates that, post-ITET, the individuals are able to respond positively.

Influence between environment and capability concepts

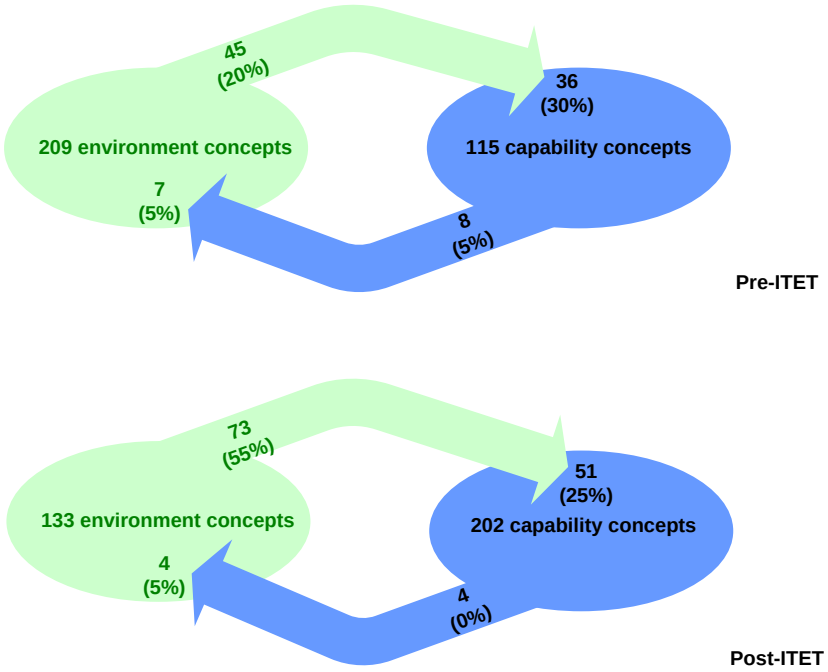


Figure A9.4 . Influence between environment and capability concepts

Figure A 9.4 show a significant decrease in the number of environment concepts post-ITET, and an increase in the proportion of these that influence capabilities. This could indicate that there is more focus on taking advantage of the supportive aspects of the environment.

The capabilities may be positive or negative (can ... can't). Nevertheless, there is a shift away from framing concepts as environment, something that is happening that is outside the influence of the individual and towards capability, or framing an idea in terms of something that the individuals conceive of as within their influence.

Influence between environment and belief concepts

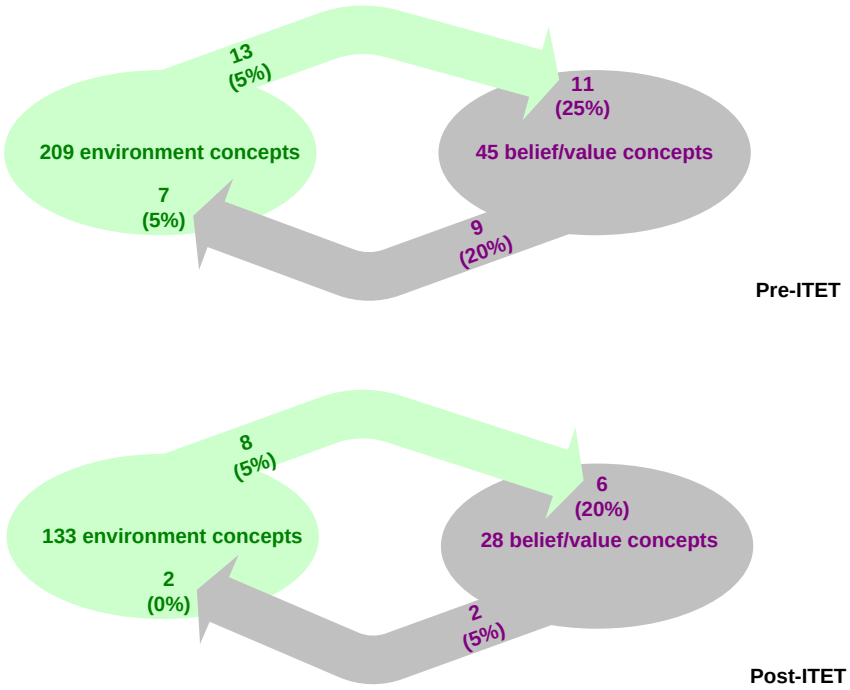


Figure A9.5. Influence between environment and belief/value concepts

In Figure A9.5, although 20-25% of the belief/value concepts are influenced by environment, this is an insignificant proportion of environmental influence overall. The post-ITET drop in the number of both environment and belief/value concepts indicates a move to more proactive strategies.

Environment and belief-value concepts form many of the 'tail' concepts in the strategy maps. Examination of the topics represented in the belief-value concepts provide more information.

Influence between environment and belief concepts

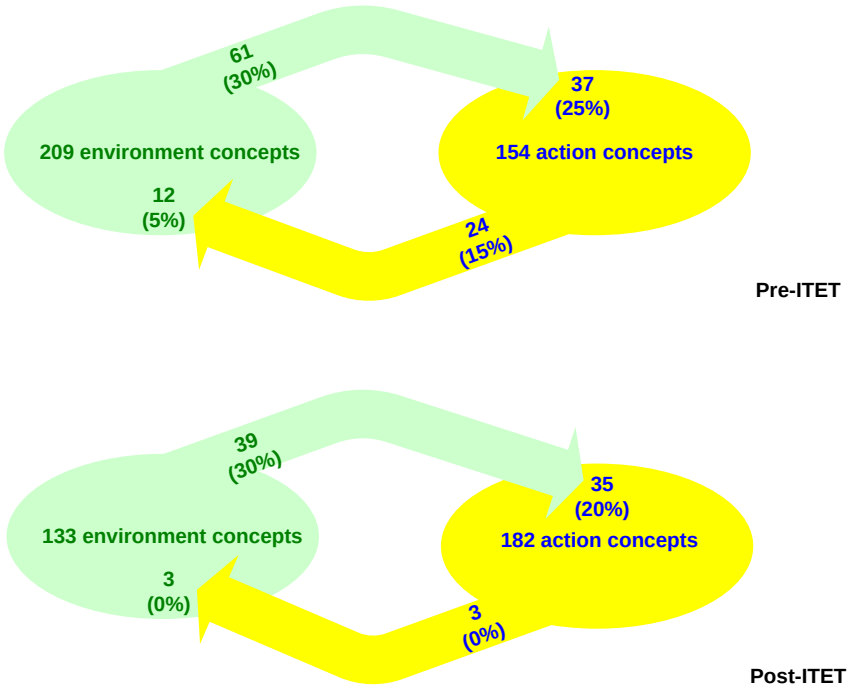


Figure A9.6. Influence between environment and action concepts

Figure A9.6 shows little change post-ITET in the number and proportion of actions influenced by the environment, even though the number of environment concepts has fallen and the number of actions increased. This is consistent with the move to more proactive strategies, focused on enabling aspects of the environment, as suggested by Figure A9.4.

Influence between environment and belief concepts

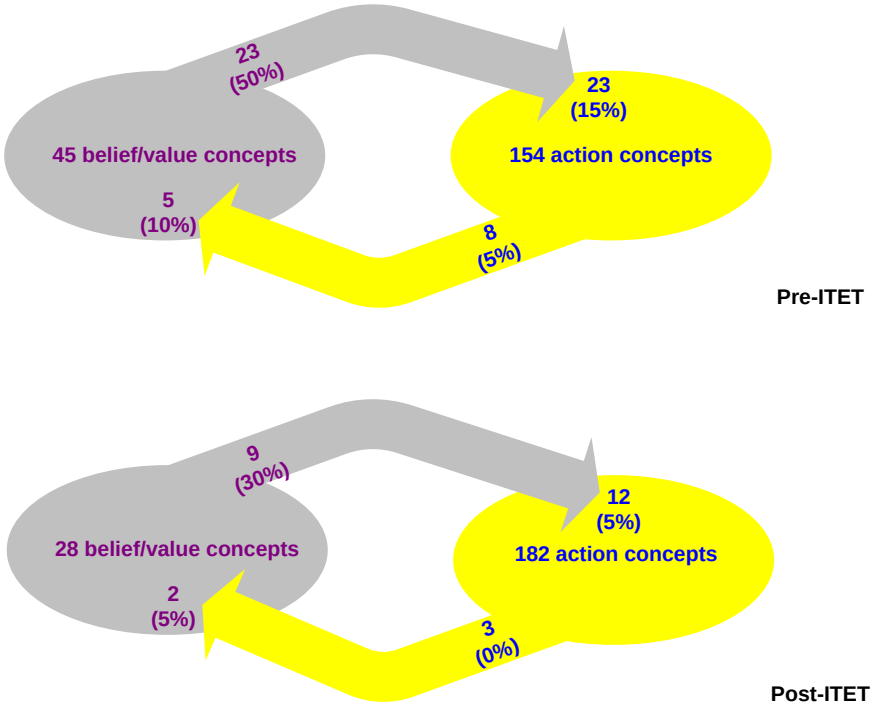


Figure A9.7. Influence belief-value concepts and action concepts

Figure A9.7 shows that pre-ITET, about half the belief/value concepts influenced action. Post-ITET, this is down to 30% and fewer actions are influenced by beliefs/values. Actions are not a significant influence on beliefs or values. Overall this indicates a slightly reduced reliance on beliefs, and perhaps a move to a more pragmatic approach.

Influence between belief-value and capability concepts

Figure A9.8 shows that beliefs or values influence about 10% of capabilities, but are not influenced by them, both pre-ITET and post-ITET.

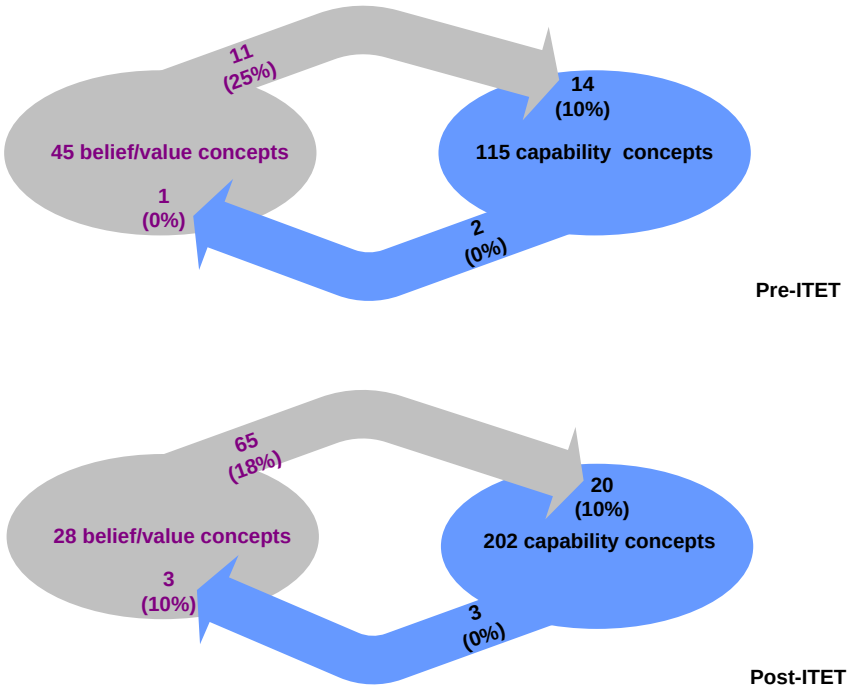


Figure A9.8 Influence between belief-value concepts and capability concepts

Content of belief-value concepts

I analysed the content of the 45 pre-ITET and the 28 post-ITET belief-value concepts in terms of the topics within the recoded concept categories (i.e. the KDIET model).

Four of the pre-ITET maps had no belief-value concepts. Extracting the 45 belief concepts into a combined map and then merging the concepts into the same summary topics as used in the other analyses, gave the overview of beliefs across the group as shown in Figure A9.9. Only topics occurring in more than one map are included. Table A9.1 lists the number of maps in which each topic occurs.

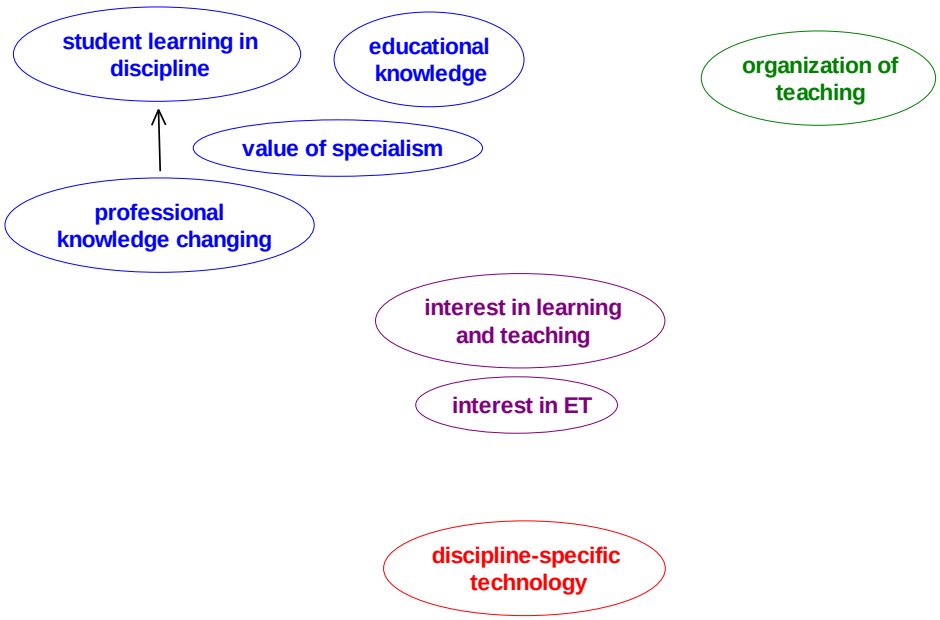


Figure A9.9

The linking between belief-value concepts is minimal. This is because belief-value concepts in the individual strategy maps are most often tails, starting points for influence upon other types of concept. There are relatively few direct links between belief-value concepts, and where they do occur they are usually part of an individual belief system. The only exception to this pattern is the link between changes in professional knowledge and student learning.

The post-ITET maps had a similar pattern, with three of them having no belief-value concepts. Extracting the 28 belief concepts into a combined map and then merging the concepts into the same summary topics as used in the other analyses, gave the results shown in Figure A9.10. Of the topics shown, most occurred as beliefs in only two separate maps. The exception was educational knowledge which occurred as a belief topic in eight different maps.

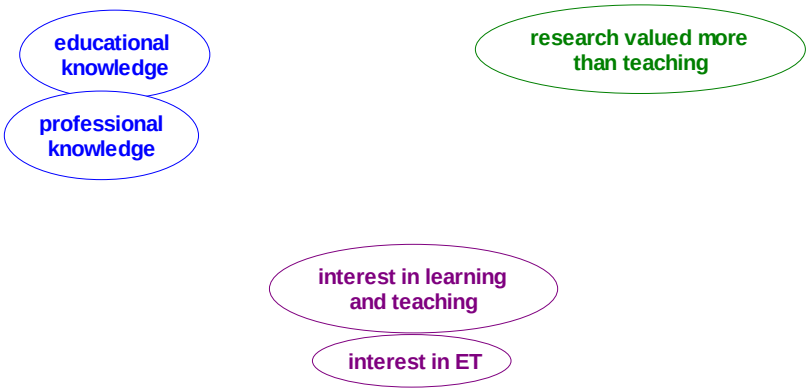


Figure A9.10

Table A9.1 lists the number of maps showing each of the topics in Figures A9.9. and A9.10.

Interest in learning and teaching, and in educational technology persists as an intrinsic individual motivation, as do beliefs about professional knowledge and educational knowledge.

Beliefs about student learning in the discipline no longer occur. This would be consistent with adoption of more methodical approaches to evaluation, based upon educational knowledge gained during the Fellowship.

Departmental beliefs on the organization of teaching become beliefs about research being valued more than teaching. This may reflect conversations about the practicalities of implementing new educational ideas during and after the ITET Fellowship.

Table A9.1 Frequency of belief-value topics in pre-ITET and post-ITET maps

Belief-value topic	no of maps pre-ITET	no of maps post-ITET
student learning in discipline	4	
professional knowledge changing	2	2
educational knowledge	4	8
value of specialism	2	
organization of teaching	3	
research valued over teaching		2
interest in learning and teaching	8	2
interest in ET	3	2
discipline-specific technology	2	