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Concept mapping: Is it a useful method when there is no 'correct' knowledge on the topic?

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Abstract

Concept mapping is a research method often used to assess participants' knowledge of a topic. Our project studied how preservice teachers' knowledge of challenging behaviour changes (or not) during their final professional teaching experience. We asked the participants to make a concept map before and after their final professional teaching experience because we anticipated it would (1) provide reflective space for the preservice teachers to think about 'what' they knew about challenging behaviour, without feeling like they were being 'tested' in an interview, and (2) illustrate knowledge change during their final professional teaching experience. However, our use of concept maps was not without trepidation because of the type of knowledge under investigation. Concept mapping to assess an individual's knowledge can be epistemologically rigid because (regardless of the quantitative or qualitative analytic approach used) maps are typically assessed against a 'correct', 'factual' knowledge-base. We, on the contrary, were interested in participants' knowledge of a contentious issue and our theoretical framework supported the existence of multiple knowledges. This case describes how we negotiated the boundaries of existing concept mapping methods to facilitate analysis of participants' understandings of 'messy' knowledge and how this changed over time.

Keywords

mapping, method, when, there, no, useful, correct, concept, knowledge, topic

Disciplines

Education | Social and Behavioral Sciences

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Concept Mapping: Is It a Useful Method When There Is No ‘Correct’ Knowledge on the Topic?

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Keywords

sociology of education, epistemology, knowledge change, concept mapping, semi-structured interviews, Michel Foucault, discourse

Relevant Disciplines

Education, Sociology

Methods Used

Semi-structured interviews, Document analysis, Observation, Focus group

Academic Levels

Advanced Undergraduate, Postgraduate

Contributor biographies

Dr. **Samantha McMahon** is a Research Fellow in the Faculty of Social Sciences, University of Wollongong, in Australia. Her research interests include sociology of education, preservice teacher epistemology and teacher education. In 2013, McMahon completed her PhD thesis, which was a study of preservice teachers’ knowledge of challenging behaviour. Her current research project focuses on AIME (the Australian Indigenous Mentoring Experience).

Professor **Jan Wright** works in the School of Education at the University of Wollongong and is also a Guest Professor at Deakin University in Australia. Her research draws on feminist and poststructural theory to critically engage issues associated with the body, health and physical activity. Wright completed her PhD in 1992, and her current research projects include the relationship between young

people's identities and their decisions about their heritage languages, and mothers' ideas about health and food and the impact of these on their practices with their young children.

Associate Professor **Valerie Harwood** is an Australian Research Council (ARC) Future Fellow at the University of Wollongong. Her research interests are inclusion, critical disability studies, the production of knowledge on child and youth psychopathology and youth exclusion. Valerie completed her PhD in 2001. Her current research projects include AIME (the Australian Indigenous Mentoring Experience) mentoring, and her ARC Future Fellowship project aims to improve aspirations for educational futures in low socioeconomic status (LSES) early childhood settings.

Abstract

Concept mapping is a research method often used to assess participants' knowledge of a topic. Our project studied how preservice teachers' knowledge of challenging behaviour changes (or not) during their final professional teaching experience. We asked the participants to make a concept map before and after their final professional teaching experience because we anticipated it would (i) provide reflective space for the preservice teachers to think about 'what' they knew about challenging behaviour, without feeling like they were being 'tested' in an interview; and (ii) illustrate knowledge change during their final professional teaching experience. However, our use of concept maps was not without trepidation because of the type of knowledge under investigation. Concept mapping to assess an individual's knowledge can be epistemologically rigid because (regardless of the quantitative or qualitative analytic approach used) maps are typically assessed against a 'correct,' 'factual' knowledge-base. We, on the contrary, were interested in participants' knowledge of a contentious issue and our theoretical framework supported the existence of multiple knowledges. This case describes how we negotiated the boundaries of existing concept mapping methods to facilitate analysis of participants' understandings of 'messy' knowledge, and how this changed over time.

Learning Outcomes

By the end of this case, you should:

- Be able to identify when a ‘master map’ approach to concept map methods is appropriate or inappropriate.
- Understand how concept maps may be used to investigate knowledge change in poststructural, epistemological research.
- Be able to assess the pros and cons of coupling concept maps with semi-structured interviews.
- Identify one part of Michel Foucault’s work that can be further explored to better understand the relationship between knowledge, discourse and concepts.

Project Context and Design: Mapping Preservice Teachers’ Knowledge of Challenging Behaviour During Their Final Professional Experience

The notion of ‘doing’ Foucaultian research is one that is rarely explained in practical terms. One scours journal articles for practical clues to what is meant by the illusive claim of ‘drawing on theories of Foucault’ and comes away, more often than not, disappointed. This case does not offer a how-to answer. What it does offer is a description of how one small part of Michel Foucault’s work inspired an innovation on existing concept mapping methods in a study of preservice teachers’ knowledge.

This project was the PhD study of Sam McMahon, who was supervised by Valerie Harwood and Jan Wright (the three authors of this case). The study focused on how preservice teachers came to understand challenging behaviour during their final professional experience (PEX).

It is well established that challenging behaviour is a slippery term that almost defies definition; for example, see the document reviews by John Visser and Ted Cole and also in Sam McMahon’s PhD thesis (McMahon, 2013). It is a term that has a rich history of varied meanings and usages across many disciplines. Indeed, ‘challenging behaviour’ could mean anything from *aggressive, destructive and self-injurious behaviours of persons with an intellectual disability* to the more generalised, common sense notion of *behaviour from any student that the teacher finds challenging*. Whilst these two definitions perhaps point to extremes, there are many other variations in

definitions along this continuum. For this study, then, there was no ‘correct answer’ against which the preservice teachers’ knowledge of challenging behaviour could be judged.

This vague and elusive term ‘challenging behaviour’ became mandated teacher knowledge in both New South Wales (in 2006) and Australian (in 2013) teaching standards. The focus of our research was to better understand (i) what, amongst all the possible ways of understanding challenging behaviour, do the preservice teachers know; (ii) how have they come to know this; (iii) how do they value, deploy and develop this knowledge in classroom settings; and (iv) how did their knowledge change (if at all) during their final professional teaching experience?

The study drew on a poststructural research approach that supported the notion of multiple knowledges, or many ways of understanding the one thing . To investigate the research problem, five final-year preservice teachers were asked to construct a concept map of what they knew about challenging behaviour and discuss this map at a semi-structured interview (both before and after their final professional teaching experience). Participants were also observed in terms of their responses to challenging behaviour when they were teaching in their final professional experience. Additionally, at the end of the project, the participants met in a focus group to reflect on their professional experience and changed knowledge of challenging behaviour.

Foundational to the interviews, concept mapping, observation and focus group data, was an extensive document review process that was ongoing throughout the entire project. As our question was, ‘what, amongst all the possible ways of understanding challenging behaviour, do the preservice teachers know,’ the purpose of this document review was to ascertain what the multiple ways of ‘knowing’ challenging behaviour might be. This document review and its findings (that identified three main ways of knowing of challenging behaviour) were critical to ensuring rigorous analysis of the concept maps.

Using concept maps to assess individual’s knowledge of ‘messy knowledge’ is an unusual and relatively new research method. In the mid-1980s, William Trochim and colleagues championed concept mapping as a research method, particularly as a means of generating models to support organisational planning, program evaluation

and research (for some open access articles, visit <http://www.socialresearchmethods.net/mapping/mapping.htm>). This first iteration of the concept mapping method was used to build and describe shared knowledge and opinions of groups of people (e.g. asking multiple persons to create a concept map that represented their understandings of an organisation's programs). These types of group-constructed concept maps consolidated statements of participants' personal knowledge, opinions or creative ideas. Around a decade later, there was a turn to use concept mapping as a means of assessing an individual's knowledge of a given topic—this is the type of existing concept mapping that is most closely related to the concept mapping methods discussed in this case.

'Multiple knowledges' and 'concept mapping' are not generally compatible notions. When used to assess an individual's knowledge of a topic, concept mapping typically assesses a person's knowledge against 'facts' or scientific truths—there is ultimately a correct answer. For ease of reference and in order to compare and contrast this type of concept mapping to the concept mapping used in this case, this is referred to in this case as the 'popular' method. The most common mode of popular concept mapping involves quantitative analysis. Typically, the quantitative style of concept map analysis measures number, structure and validity of conceptual links made in each map, often in comparison with an expert, or master, map. Ian Kinchin and colleagues were amongst the first to argue that although concept mapping is often used to gather quantitative data, there is scope for qualitative analysis. This case further explores this argument in terms of describing the use of qualitative analyses of concept maps to assess understandings of multiple, and so messy, knowledges.

Research Practicalities

This PhD research project was carried out between April 2009 and January 2013, in the School of Education at the University of Wollongong. The participants were five preservice teachers in their final year of study (all female) and their mentor primary school teachers (four females, one male) for their final professional teaching experience in five state-funded primary schools in Sydney and the Illawarra region in New South Wales, Australia.

One may wonder why we chose to do concept mapping at all, especially given its epistemological mismatch with our theoretical framework that supported multiple knowledges. Why not just ask the participants what they know during an interview? This was a study of preservice teacher epistemology, so the problem wasn't just ascertaining what they knew, but also how they came to know in this way. We didn't want the interviews being 'taken up' with long pauses while the preservice teachers recalled what they knew about challenging behaviour. Instead, we wanted them to think about that before the interviews. The concept maps were constructed in a time and location of the participants' choice, prior to both the pre- and post-PEX interviews. The concept maps were included in the design as an opportunity for the preservice teachers to reflect on and express in a considered way (by constructing a text) 'what' they knew about challenging behaviour. At the beginning of their interview, they would talk us through the 'what' of their knowledge: they would explain their concept map. There was then plenty of interview time left for us to ask 'how' they came to know this: Where did they get this knowledge from? Which parts of this knowledge did they value most? Why?

Most of the research issues encountered related to discerning how best to negotiate the epistemological rigidity of popular concept mapping methodology to suit our research problem, design and content. The following subsections describe the main issues with the research practicalities.

Defining the Different Possible Ways of Knowing (or Discourses of) Challenging Behaviour

The debates around definitions of challenging behaviour are numerous, contentious and multidisciplinary. Mapping the participants' knowledge and knowledge-change against all these definitions and disciplines would be an impossible task. The theoretical approach we chose demanded analysis of knowledge not in terms of the concepts' definitions but in terms of the discourses that were drawn from to construct the knowledge. The problem facing this study was that there were no existing meta-analyses that described discourses of challenging behaviour. We undertook an *extensive* document and literature review, from which we argued

that there are three overarching ways of knowing (or discourses of) challenging behaviour. A fuller description of this analytic process and the three discourses is available in Harwood and McMahon (2014).

Defining What a Concept Map Is (or Is Not!)

Popular concept mapping methodologies need to be quite specific about what constitutes a concept map because they analyse certain elements of it (e.g. number of spokes, hierarchies of concepts, map structure). We were interested only in the participants showing what they knew, we didn't mind what technique they used. We told them to, 'use whatever method and media that you believe most easily and best represents what you know.' Although this instruction permitted creativity it also generated logistical issues. The formats of the concept maps were incredibly varied in the following: *size* (the largest concept map was handed in on A1 tracing paper, approximately 65cm × 84cm); *presentation* (single- or double-sided, spanning singular or multiple canvases/papers); and *legibility* (some were computer generated, others featured handwriting that was at times difficult to read; one person used yellow markers to write). When reading and analyzing the concept maps, such variations in format were cumbersome. Additionally, there was the challenge of deciding and resourcing how to create digital copies that would be acceptable for thesis printing or journal publication whilst retaining legibility.

Deciding on an Analytic Frame for the Concept Maps

Allowing free-form concept mapping of complex and contentious knowledge meant abandoning any form of popular concept mapping analysis. This generated the analytic problem of comparing apples with oranges. If we could not easily compare the concept maps, or assess them against a master map, we needed an epistemological benchmark of sorts. An innovation on concept map methodology was necessary. Rather than using popular qualitative methods (such as classifying the structure of the concept map, for example, see Kinchin and colleagues, 2000), we decided to *compare and contrast the content of the concept maps to the different ways of understanding (or discourses of) challenging behaviour uncovered in the document and literature*

review. To inform the design and justification of this approach, we used Foucault's work on the relationship between concepts, discourse and knowledge. Particularly we drew from the book *The Archaeology of Knowledge*, where Foucault talks about the rules of discursive formation and the formation of concepts. A comprehensive explanation of how we did this is offered in McMahon(2013).

Coupling Concept Mapping with Interviews

The study design offered the participants an opportunity to explain each of their concept maps in an interview. The inclusion of interviews to allow participants the chance to explain a personally constructed text (such as their concept maps) was both a strength and weakness of the research design. The strength was that the co-deployment of these two methods generated a richness of material that was not anticipated; the interviews didn't simply explain the concept maps, they indicated participants' knowledge beyond what was represented in the concept maps. Conversely, this method has potential weakness in terms of creating analytic dilemmas. Bonita White identifies such dilemmas in her study of preservice teacher epistemology. She argues that the methodological utility for using interviews when studying preservice teacher knowledge, as opposed to their constructed texts, is the opportunity for 'probing' questioning. However, she also contends that this may result in the methodological tension of the preservice teachers adjusting their knowledge en route during the interview (i.e. changing their response to the question as they speak). The resolution to such tensions, White proposes, is to limit analysis to the participants' final version of an answer. However, our study design addressed this problem differently, by allowing multiple opportunities for triangulation of representations of the preservice teachers' knowledge across various data sources (including interview, observation and focus group data). In this study, epistemological 'tensions' were conducive (rather than confounding) to the project's findings. Dissonances in a given participant's knowledge expressed within and between these data sources became analytic points of interest that were accounted for by theorizing epistemological practices that explicated such contradictions and confusions.

Concept Map Methodologies: The Problem of Messy and Multiple Knowledges

Kinchin and colleagues contend that, rather than addressing issues of knowledge validity, a qualitative approach to concept mapping that focuses on the structure or shape of the concept map has potential to assess the significance of individual perspectives and contexts. However, to date, qualitative studies have tended to discuss analysis of concept maps in terms of their utility in the formative assessment and facilitation of learning specific (often scientific) concepts, such as concepts presented in studies of nursing and medicine, computing, accounting, science, mathematics and law. This indicates that, regardless of whether quantitative or qualitative analyses are used, popular concept mapping methods consistently compare participants' knowledge and learning to a set, scientific truth.

Measuring a person's learning of scientific truths is entirely reasonable if you're assessing what someone has learned about a discrete factual subject such as physiology or physics. However, we argue that 'challenging behaviour' is not a term that represents a set, scientific truth. Given this, a Foucaultian analysis capable of supporting considerations of multiple discourses, knowledges and truths affords a much richer picture of the participants' knowledge as complex and multidimensional.

Foucault's work was important to the design of our study because it links the ideas of knowledge, discourse and concepts. In Foucaultian terms, discourses are, to oversimplify, ways of knowing. For example (and please bear with us here for the tangential example), a farmer, dietician, botanist, economist, green grocer and chef will all have very different ways of knowing about an eggplant. Or, if you like, they each use a different discourse for talking about eggplants. Foucault's work in *The Archaeology of Knowledge* thinks through how to put boundaries around discourses: how is it that there are such distinctly different ways of knowing the same thing? Why is it, for example, that the farmer is remarkably unlikely to talk about his or her crop of eggplants in terms of calories harvested? Would a culinary text like a recipe use an eggplant's binomial name (*Solanum melongena*) like a botany journal would? Why not? Foucault theorised that this lack of discursive overlap is, at least in part, because there is a unique set of relationships between concepts in each discourse (see the

section in *The Archaeology of Knowledge* on ‘the formation of concepts’). So, the graphic representation of the relationships between concepts offered by concept maps provide interesting points of analysis.

In the context of this study, our ‘eggplant’ was challenging behaviour. Although there was great dissent regarding definitions, there were also some discursive regularities within and between disciplines regarding challenging behaviour. We identified these discursive regularities as three distinct and arguably mutually exclusive discourses of challenging behaviour (for details on how we did this, see the Harwood & McMahon, 2014, or McMahon, 2013). The examples of concept map analyses provided in this case trace the relationship of the concept ‘biology’ to the concept of ‘behaviour,’ and how these relationships differed across different discourses of challenging behaviour. Thus, along these lines the three discourses are briefly described:

1. the *biomedical* discourse (that holds the child is challenging because of some biological dysfunction and so isn’t to blame for their behaviour, they can’t help themselves)
2. the *biopsychosocial* discourse (that holds the child may have biological anomalies that contribute to their challenging behaviour, but that ultimately behaviour is teachable and learnable)
3. the *ecosocio* discourse (marginalizes biological concerns and holds that behaviour is mostly informed by environment, thus adults are primarily responsible for addressing the contexts and structures surrounding the challenging child to be more supportive of their behaviour)

These discourses were the epistemological benchmark that replaced the master map of popular concept mapping methods. These discourses did not represent a ‘correct answer’ but a set of three distinct, possible ways of knowing challenging behaviour. Which of these possible ways of knowing did the preservice teachers draw on to understand challenging behaviour? And did this change over the course of their final professional experience? The following section demonstrates exactly how we explored these questions.

Foucaultian Concept Mapping in Action

Foucault's focus on the relationships between concepts guided analysis of how the preservice teachers wrote (and spoke) about that which they knew. This analysis comprised two phases. Phase 1 involved a thematic content analysis of the concept maps so as to compare and contrast 'what' the preservice teachers knew about challenging behaviour. The focus of Phase 2 of the analysis was: Where on the concept map, and graphically in relation to what other concepts, did each theme feature? From this second phase of analysis, by comparing this with the conceptual formations of the three discourses we proposed, we could name what discourses the preservice teachers were using to construct their knowledge.

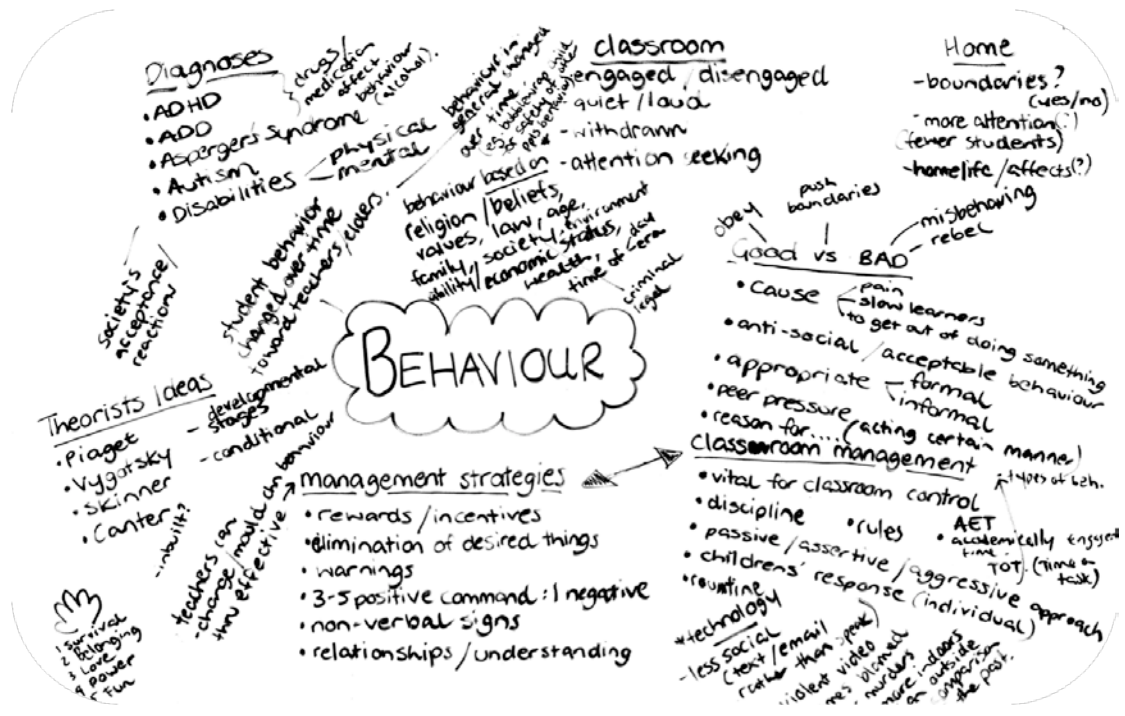
Discerning Which Discourses Are in/Forming

Knowledge

Behaviour and biology attracted comment from the preservice teachers in their concept maps, particularly via references to the nature/nurture debate, behaviour disorders, disability and physical pain. This section offers an example of the differing conceptual relationships between biology and behaviour in two concept maps.

Biology's conceptual relationship to challenging behaviour is different in each discourse (see the summary above and Harwood and McMahon, 2014). We show how analysing the relationships between biology and other concepts on the participants' concept maps offers indications of which discourses were being used by participants to construct their knowledge. First, let's look at Merrin's pre-PEX concept map (Figure 1) and how its placement of biology in relation to other concepts shows her biomedical understandings of behaviour.

Figure 1. Merrin's pre-PEX concept map



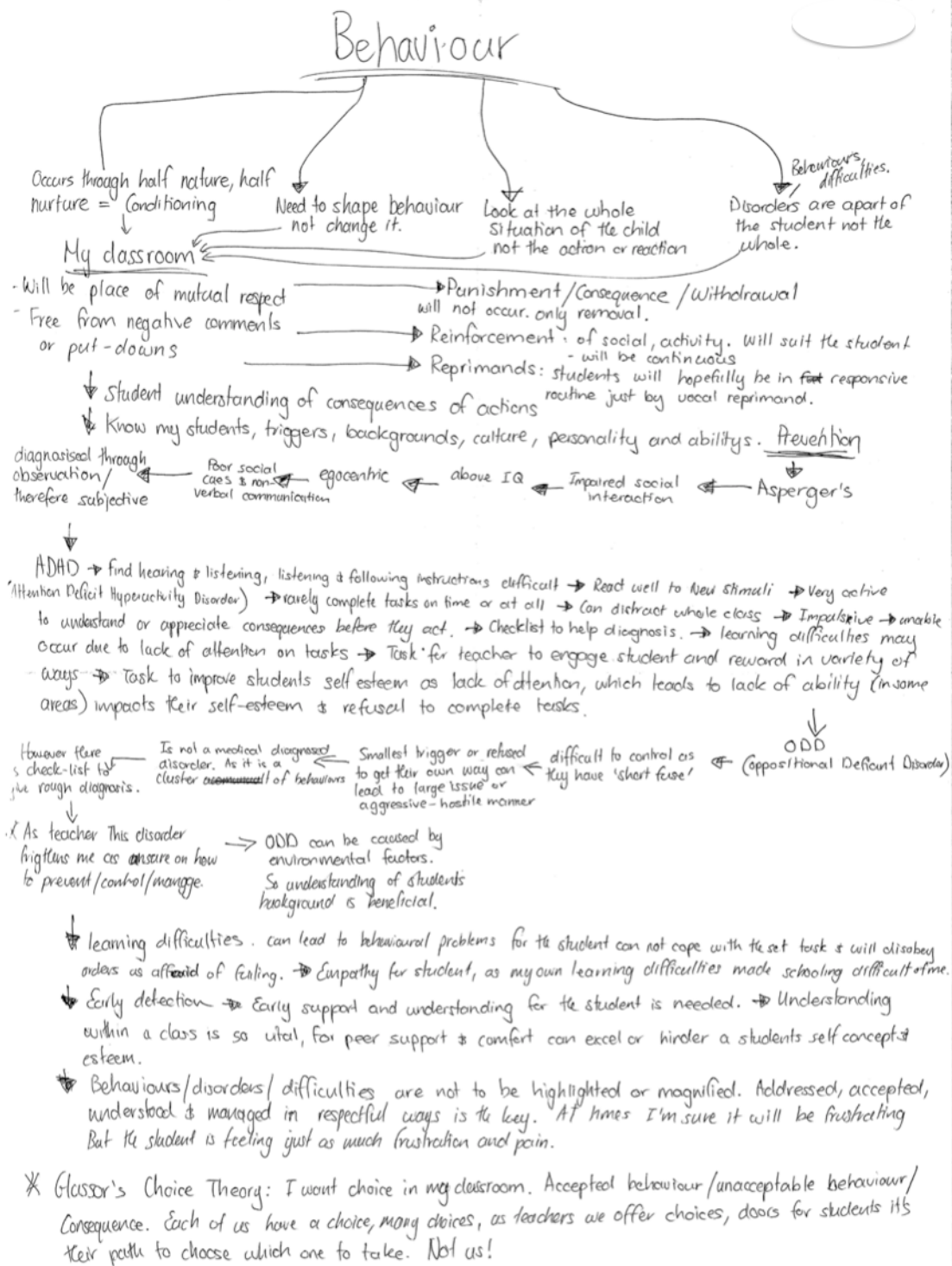
Merrin allocated ‘pain,’ a biological response to stimuli, in a hierarchy of relationships: under the main heading ‘Good vs Bad [behaviour],’ the first subheading she listed was ‘cause,’ and one of the listed causes was ‘pain.’ This positioning, at first glance, seems conceptually out of place as the bulk of subheadings under the heading ‘Good vs. Bad’ relates to reasoning for behaviour and abilities to detect and conform to behavioural norms. Interestingly, Merrin lists several behaviour disorders and mental and physical disabilities under a separate main heading ‘Diagnoses’—and not as a subheading under ‘cause’ of ‘Good vs Bad [behaviour].’ Whereas the ideas expressing what constitutes good vs. bad behaviour point to social skills, reasoning and pedagogical considerations such as learning ability, Merrin’s knowledge of diagnoses considers medication’s effect on behaviour.

It is also striking that Merrin did not graphically link the concept of diagnoses, behaviour disorders, medication or disability to any of the three classroom related level 1 headings featured in her concept map: that is, ‘Classroom,’ ‘Classroom Management’ and, by direct link/arrow, ‘Management Strategies’ (and their respective dot points and subbranches). Such clear conceptual separation of the clinical aspects of behaviour from the social and pedagogical is noteworthy: It indicates that Merrin’s concept map draws almost exclusively on the biomedical discourse of challenging behaviour. That is, her concept map casts behaviour disorders as biological anomalies within a child, to be treated with medication, and

conceptually divorces disorders and disability from classrooms, where behaviour is to be managed, taught and learned.

Anne's pre-PEx concept map (Figure 2) shows that her conceptual relationships for behaviour disorders were markedly different from Merrin's, and this indicated a different discursive positioning.

Figure 2. Anne's pre-PEx concept map



Before delving into differences between Merrin and Anne's ways of knowing (or discursive alignments), it is important to note one conceptual relationship is treated similarly. Both Merrin and Anne featured disorders under a level 1 heading and so directly related it to the central concept of behaviour. However, there the similarities end.

Anne and Merrin's different treatment of level 1 headings dealing with behaviour disorders is evident on a first reading of the maps. Whereas Merrin's map directly relates medication and its effects to behaviour disorder diagnoses (and so draws on the biomedical discourse), Anne's map negotiates such clear-cut clinical lines by imbuing disorders with pedagogical considerations from the outset; she frames the disordered individual as a student within a classroom environment. Anne writes 'Disorders—behaviour difficulties—are a part of the student not the whole' and the connecting arrow relates directly to the next heading 'My classroom,' a section of the concept map that deals with broad pedagogical guidelines for addressing classroom behaviour. This directly speaks to the central tenet of the biopsychosocial discourse that behaviour (regardless of biological dysfunction and/or input) is primarily taught and learned. This biopsychosocial conceptual relationship between disorder, student and pedagogy is played out under another major heading, 'Prevention.' In Anne's concept map 'Prevention' immediately follows 'My classroom.' Under the heading 'Prevention,' Anne displays her knowledge of certain behaviour disorders (Aspergers, ADHD and ODD) and, for each, lists major features' or symptoms and how it is diagnosed. For ADHD (attention deficit hyperactivity disorder) and ODD (oppositional defiant disorder), Anne also lists specific pedagogical implications or 'tasks for teacher' in addressing children who have such a diagnosis. These references to diagnosis-contingent pedagogy arguably draw on biopsychosocial discourses prevalent in teacher education, especially in the special education field (as argued in McMahon, 2013, and McMahon, 2012). That behaviour disorders are discussed under the heading 'Prevention' is most interesting and is, perhaps, related to what Anne writes towards the end of the chain of concepts, 'early detection → early support and understanding for the student is needed.' The inference is that once one knows and understands the child's disorder one can intervene by offering particular and diagnosis-appropriate pedagogical and pastoral support. As part of this, Anne's concept map firmly positions her, as teacher, in the diagnostic apparatus, citing teacher checklists and observations as 'helping' to achieve diagnosis. Thus, Anne's concept map frames diagnosis of biological disorder as ultimately favourable for students, teaching and learning. Unlike Merrin, she does not relegate responsibility for behaviour disorders to clinicians to remedy; she positions the child with challenging behaviour as being able to respond to and improve with educational

interventions and responsabilises herself as teacher to manage this. Overall this positions her understanding of biology and behaviour as mostly drawn from the biopsychosocial discourse.

This section has shown how a Foucaultian analysis of concept maps can examine the graphical relationships between concepts for indications of the discourse informing the participant's knowledge.

Using Foucault to Track Knowledge Change Over Time

The previous subsection has shown how it is possible to identify what discourses are being drawn on for knowledge construction. But remembering that the focus of this research was knowledge change over the duration of the participants' final professional experience (PEX), how did we detect and interpret participants' knowledge change through our comparison of pre-PEX and post-PEX concept maps?

Some of the ways we could tell if knowledge had changed over time related to what Foucault called the 'displacement' and 'transformation' of concepts. For example, we would look to see if (i) something from the pre-PEX concept map was omitted from the post-PEX concept map (and so was displaced); (ii) something new was added to the post-PEX concept map (representing new knowledge); and (iii) there were changes to the relationships between concepts, which could be indicated by connecting lines or groupings of statements (representing that different discourses were drawn on, or that the knowledge had been transformed). To demonstrate this process, we compare and contrast Monique's pre- and post-PEX concept maps.

Figure 3. Monique's pre-PEX concept map

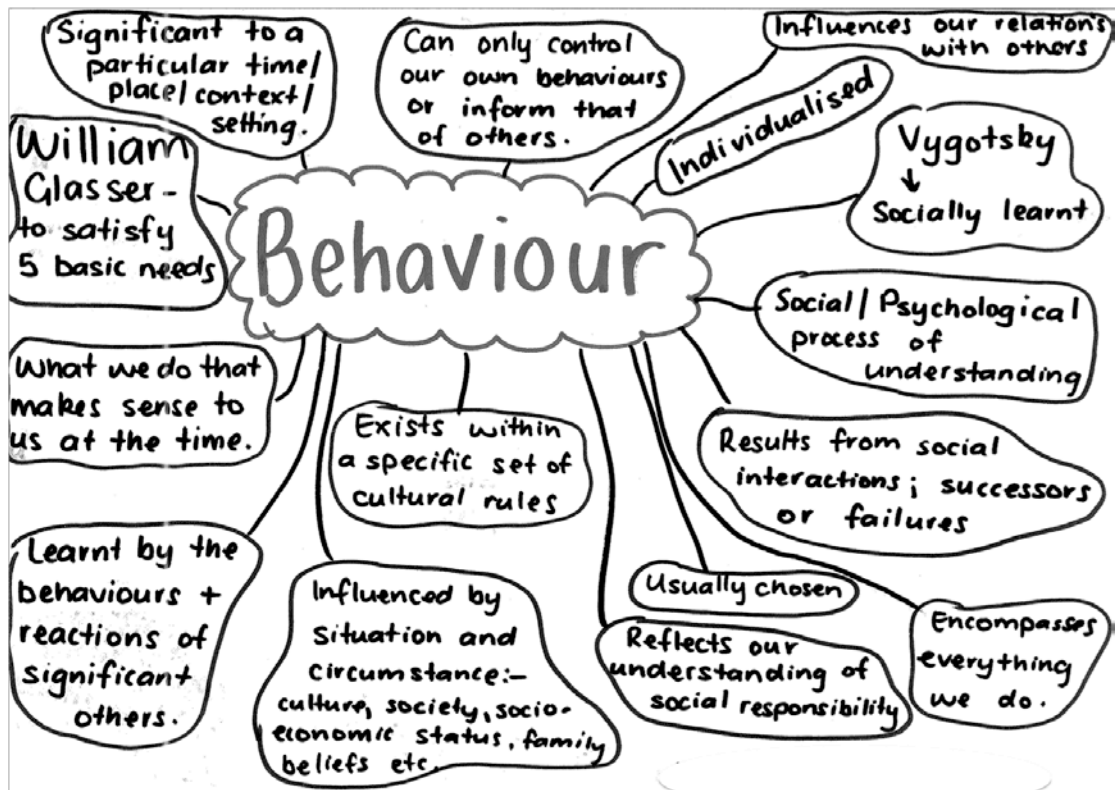
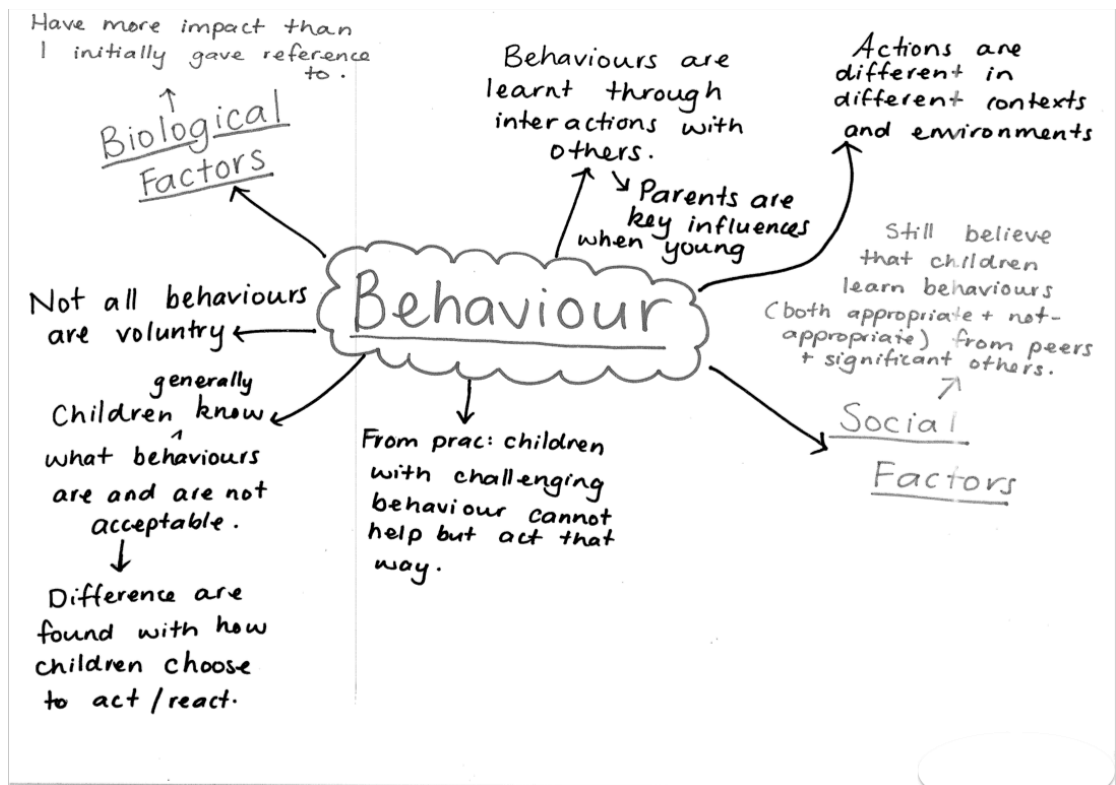


Figure 4. Monique's post-PEx concept map



Sustained from Monique's pre-PEx concept map to her post-PEx concept map were themes of behaviour being connected to choice, social factors, relationships and interactions and environmental factors. Themes that featured in Monique's pre-PEx concept map (Figure 3), but were displaced from her post-PEx concept map (Figure 4) included notions of social responsibility, assertions that individuals can control only their own behaviour and references to behavioural theorists, namely William Glasser and Lev Vygotsky. The most striking new features in Monique's post-PEx concept map were her inscriptions: 'Biological Factors—Have more impact than I initially gave reference to'; and 'From prac: children with challenging behaviour cannot help but act that way.'

An analysis of her concept maps alone, points to a fundamental shift in Monique's knowledge understanding of challenging behaviour. Post-PEx, her *general* representation of behaviour (the central concept of her concept map) remains biopsychosocial insofar as it attends to biological and social factors and centres on notions of choice and stimulus/response psychology (insofar as behaviour is cast as involving 'react[ionary]' choices). However, challenging behaviour, specifically, was cast as beyond personal choice and the possibility of learning alternative behaviours: The person 'cannot help but act that way' (Monique, post-PEx concept map). This notion of the inactively challenging child who cannot help but be challenging is peculiar to the biomedical discourse. Considering this, its new inclusion in a graphic representation of otherwise biopsychosocial knowledge creates a striking conceptual juxtaposition—and tells us that very particular lessons were learned teaching children with challenging behaviour during her PEx.

The discussion of the analysis is necessarily incomplete. There is not scope here to attend to all the contradictions and exceptions and to offer triangulation with other data sources. Instead, the point of this case is to demonstrate that a qualitative analysis of concept maps, using Foucault's theorisation of knowledge, discourse and concepts, can be helpful in analysing participants' messy knowledge.

Foucaultian Concept Mapping: Practical Lessons Learned

The following are five practical lessons we learned from our experience of “doing” Foucaultian concept mapping:

1. *Consider and plan for the logistics of presenting the concept maps in your thesis or journal articles.* Provide guidelines that specify acceptable paper sizes, formatting and technology. Also give some thought as to whether you present the concept maps *in situ* as figures in the discussion or whether to include the concept maps as appendices (and, if appendices in a thesis, perhaps put all maps in one appendix and print them on a different coloured paper?).
2. *Differentiating discourses is challenging (theoretically and practically).* We strongly suggest that the easiest circumstances for adopting the approach to concept mapping described in this case are when the literature identifies existing, agreed-upon and named discourses on the contentious topic. A good example of this might be if you were conducting a study of teachers’ knowledge of what constitutes healthy foods. You could identify what content or statements from the teachers’ concept maps align with and are drawn from discourses that are already clearly defined in the literature, such as dietetics, culinary arts or new health imperatives discourses. On the other hand, figuring out what these discourses might be (from scratch) is a difficult task that takes incredible time resources—we’re talking hundreds of documents and months of nothing but reading to construct an archive big enough to warrant claims that you can discern particular discourses on a topic. Moreover, you would need to have excellent guidance and supervision in applying complex theoretical rules (in this case, Foucault’s ‘Rules of Discursive Formation,’ from his book *The Archaeology of Knowledge*).
3. *Go deep, not wide.* This method of concept mapping generates huge amounts of qualitative data to work with, so look at the knowledge, knowledge change and reasoning of a few people in depth. We suggest that this is not a practical method for medium or larger scale studies.
4. *Coupling concept maps with interviews* provides excellent opportunities for triangulation of participants’ statements regarding their understandings of the topic. It also allows you to move beyond questions of what the participants know (as per their concept map) to probing questions regarding how they came to know it in that particular way.

What Does All This Mean Methodologically?

Concept mapping *can* be used in studies where the theoretical framework supports the possibility of multiple ways of knowing or understanding. However, we caution that you must engage in analyses that are consistent with your theoretical approach. The example we have offered here is of using Foucault's theorisation of knowledge, discourse and concepts, but we suggest that there is scope for other theories that fit your study to be similarly applied.

This is (to the best of our knowledge) a new approach to concept mapping methodology. Like all things new, it is imperfect and still in need of development. There is an obligation to replicate, develop, interrogate and critique this method, to apply it to new contexts and share findings from your efforts.

Exercises and Discussion Questions

1. Make some decisions regarding which type of concept mapping to use. Classify the following topics into two groups: (i) topics suited to popular concept mapping methods (where the focus is knowledge of facts or a scientific truth), and (ii) topics better suited to poststructural analyses of concept maps (that support multiple knowledges of a single topic). The topics: *emergency room triage practices, abortion, experiences of asthma patients, problem solving skills, climate change, faith, preparation of a 'balance sheet' for end of financial year, phases of the moon, World War 1*.
2. What are some advantages and disadvantages of coupling interviews with concept mapping methods?
3. What was the key text by Michel Foucault that informed the design of the research method used in this case? Why was it helpful?
4. What theoretical framework are you using for your study? Are there other (non-Foucaultian) poststructural theories that could be appropriate for analysing multiple knowledges represented in concept maps?

Further Reading

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