Flowcharting: Its Use As A Tool For Professional Development.

Introduction

The recent Ramsey Report has identified the need for ongoing professional development experiences for teachers

> Teachers should have regular opportunities for professional renewal. It is unrealistic to think that professional people can maintain the quality of their practice, including the creation of effective learning environments, unless they are provided with these opportunities (2000, p.78).

The purpose of this paper is to explore the use of flowcharting in professional development as an analytical tool, a research methodology tool and as a professional development tool.

My interest in the flowcharting process was a secondary one born out of necessity rather than part of the initial design for my research. The focus of my research concerns the ways in which classroom teachers implement aspects of a professional development experience into their classroom practice. This appropriation, as Leontyev (1981) termed it, demonstrates the ability of teachers to both engage in the mental mastery of subject matter and then to appropriate necessary aspects of it into their existing mental schema. Once appropriated it becomes a part of their mental tools, available for active use. These cognitive structures then continue to change and grow as they are used to develop further understandings for a variety of purposes. To gain increased understanding about this process, I had collected a range of data that included field notes, maps, diagrams, a series of interviews with a number of classroom teachers and a great many hours of video data. This video data focussed on the two-hour classroom literacy block and had been collected over a five-day period, a total of ten hours videotape per teacher.

For some time I had struggled with various ways to deal with analysing the complexity of the video data. I needed to gain control over both the amount and complexity of the data and also incorporate a process of member-checking my findings with the stakeholders. I needed access to the classroom realities of each of the teachers participating in the study, some type of lens through which to view the data. Ideally I needed to be able to access some type of structure that delineated each teachers' 'created realities'. Which as Guba and Lincoln discuss

> …do not exist outside of the persons who create and hold them; they are not part of some 'objective' world that exists apart from their constructors. They consist of certain available information configured into some integrated, systematic, "sense-making" formulation whose character depends on the level of information and sophistication (in the sense of the ability to appreciate/understand/apply the information) of the constructors (1989,p.143).

It was during this time that I read Barton's thesis (2000) and discovered that she had recently used flowcharts in the education sphere. Part of her research had involved the construction of a series of flowcharts with a number of school principals. These flowcharts had been developed by the principals to demonstrate the complexity and intricacy of their individual learning environments.

Having used a form of flowcharting process often myself to make clear the connections in a complex document such as a literature review or a research report, I decided to investigate the process further.

What Is Flowcharting? A Brief History

Flowcharting in a variety of forms has been a function of logical thought down through the ages. Early forms of flowcharting assumed the form of tree figures that were used to represent relationships between and among different species. These are still in common use today in demonstrating the evolutionary history of a species and also in genealogy to depict the connections between people in a

family tree (Gardiner, 1982). John Venn's diagrams, used to represent the relationships between sets of information are also still in common use in schools today to demonstrate the similarities and differences between two sources of information (Gardiner, 1982; Maxfield & Brown, 1998). These flowcharts or logic diagrams eventually led to the development of a series of logic devices or machines created by Carroll, Jevons, Marquand, Babbage and Zuse, among others, which played a significant role in the development of the computer (Goldstein, 1972; Shurkin, 1984; May, 1996).

A flowchart may assume a variety of forms or structures dictated by the task at hand, but as McQuigg and Harness discuss,

> A properly prepared flowchart is like a road map. It can be used to plan important steps in your thinking. It can be used to help you remember how you arrived at a certain point in your thoughts. Sometimes a flowchart will help you find a better way to solve a problem (1970, p.iii).

It was this aspect of flowcharting, the notion of a roadmap that could assist in making explicit the thought processes and decisions that influenced and preceded the changes teachers made in their classrooms that was so tantalising. Was it indeed possible to construct a flowchart to demonstrate this process? Could it also be used as a way to take control of the video data? What began as a desperate attempt to take control over complex data became a journey of discovery into the thought processes of a number of classroom teachers. What follows is the story of one of them as she interacts with this process.

Flowcharts: A snapshot of one teachers' journey.

The process of how one teacher translated the actuality of a professional development experience into her own classroom practice will be chronicled through her interactions with a flowcharting instrument. Her reflections on and

growing understanding of the power of this process revealed through a series of interviews.

Em is a teacher working in the Catholic Education System who has over twenty years experience as a classroom teacher. She has worked on various year groups over this period and at the time the research occurred was working on a Year 1/2 class in a school with a large percentage of NESB (Non English Speaking Background) students.

Em's self-portrait of her teaching style and abilities describes herself as,

> …a good teacher, but I always thought that I could take things further, you know, put what I already knew into another perspective or bring another perspective into it (M99901).

She is aware of her teaching-learning journey, her growth as a teacher over time, and the impact of this growth on her students,

> I mean years ago I taught by the syllabus. I just taught because it said 'teach them the days of the week'. Now I look at them and think that they need to know the days of the week when they do anything. In your daily life you have to know how to read through your diary and be able to check your calendar for appointments. I look more now at all of the things I do as an adult and try to think where I learnt it. I think these are important things that children need to know and focus on (M99901).

Em's flowcharting experience began with a sense of confusion about the process, and a request for clarification

> …is it the same as a concept map or a mind map? How is it supposed to look? (M99901)

This sense of confusion by participants about what a flowchart was and the form it should take resulted in me creating an example of a flowchart (See Figure 1). The creation of this sample flowchart required that I return to earlier survey data from teachers regarding their perceptions of a professional development experience involving language and literacy.

Although this is written in a linear manner for initial feedback from you this is not a linear process — How did it work for you?

'a' A Professional Development Expert

'b'
- Challenged
- Affirmed
- Informed
- Reminded

'c' Reflection raises a series of questions

'd'
- What does this mean for my classroom?
- Does this make sense in the light of my experience & tacit knowledge?
- What do I do now to continue this growth?
- Can I innovate on this practice to improve my teaching?
- Can I improve on what I already provide?
- Will these practices work in my classroom?
- How can I implement that practice into my current classroom structure?
- Would these types of organisational structures work in the physical environ of my classroom?

'e' Change

'f' What type of change?
- Physical space in classroom
- Organisational structures of the teaching day
- Types of activities used
- Resources used
- Teaching language used
- The way I think about my teaching practice
- The way I talk to my students
- The way I talk to other teachers
- My ideas of why I'm doing things this way
- My understanding of how learning occurs
- My understanding of how I best facilitate learning
- My understanding of the benefit of collegial networks

* Could also be others — feel free to add

* Could be a combination

* Not the only types of questions — please add others

\# Not the only results — what you did is much more important.

This figure is a representation or an overview of a process, using the results of previous teacher surveys to highlight aspects of the process.

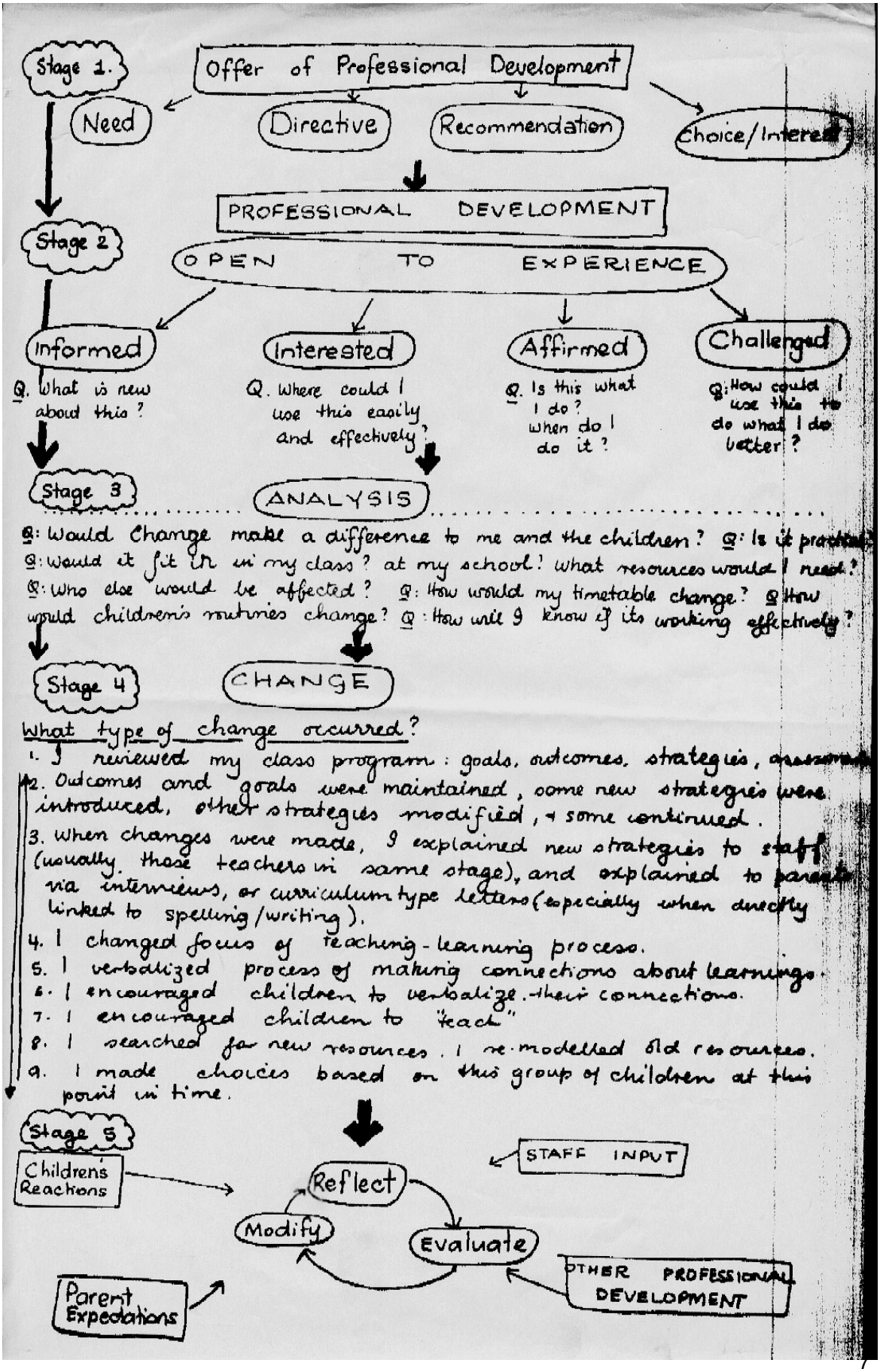
- The terminology selected in column 'B' directly relates to the categories identified within the original survey data (Challenged, Affirmed, Informed, Reminded) as teachers discussed their reactions to a professional development experience.
- Column 'C' (Reflection raises a series of questions) also reflects this data by noting the role of reflection in the process.
- The series of questions raised by reflecting on the professional development experience (column 'D') are examples of the types of questions teachers reported in previous survey data as part of the change process.
- Column 'E' reflects the process of change subsequent to a professional development experience.
- Column 'F' denotes the types of changes that teachers reported making in their classrooms captured by original survey data

During my construction of this sample flowchart for the teacher participants, it became obvious to me that it in fact represented a type of Grounded Theory that related to and flowed from the original survey data on teacher professional development.

Although Em created her own flowchart that demonstrated her individual process (see Figure 2) her reaction to the example flowchart was interesting,

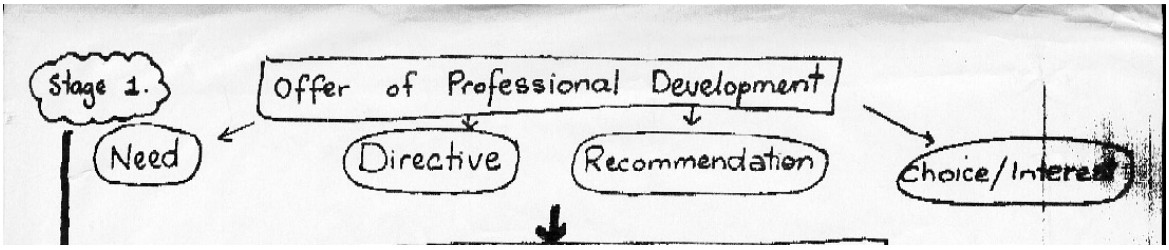
> It doesn't go back far enough; there is something that happens before any professional development experience that needs to be shown. This is what I've called Stage 1 in my flowchart (M10102).

Figure 2



Stage 1 of Em's Flowchart

Figure 3

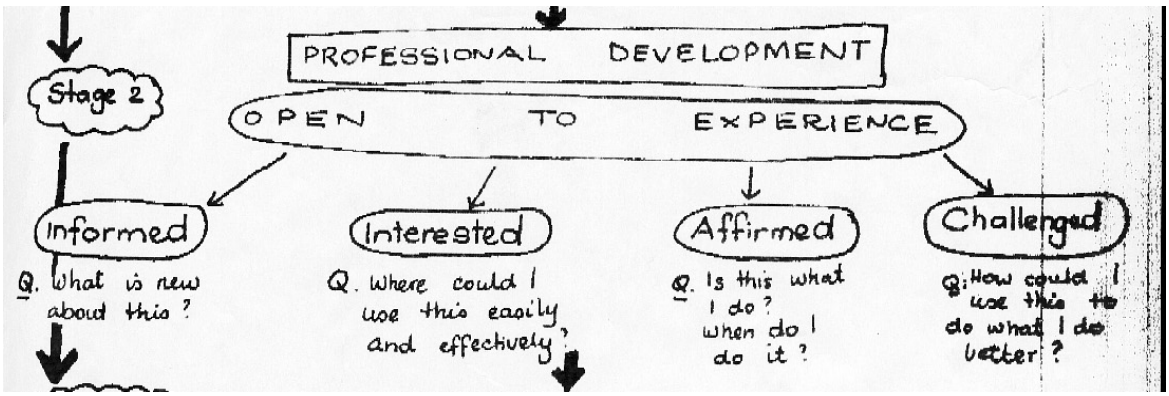


Em felt that this was a vital aspect of any professional development experience and directly impacted upon the results of that experience for teachers.

> If I have a need for a particular type of professional development that I have already identified or a certain professional development course is recommended to me by colleagues or I have a particular interest in that area, I go with a very different attitude than I would if I had been directed to attend by someone in authority. My attitude towards that experience will be a very different one and will have a direct impact on how I relate to that experience and what I take away from it. That's why I put in 'Open to Experience' in stage 2 of my flowchart (M10102).

Stage 2 of Em's Flowchart

Figure 4



Em also discussed another vital aspect illustrated in this stage of her flowchart

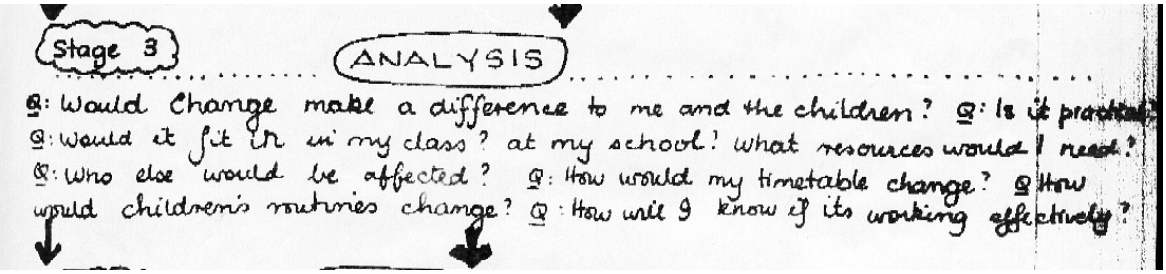
> Although each of those experiences that I've noted are important in the process and I ask myself different questions about each of them, one of them is far more important than the others. It is important that I'm informed; I want to know what's new about this. It's also important that I find it interesting; I want to know where and how I could use this. The challenging component for me is also important, how can I take this and make what I do even better. But the most important thing for me is that any form of professional development affirms my existing practices as a teacher. In fact this aspect is so important that if it is missing, it seems to shut down the process. There is a direct link between this and that 'Open to Experience' component that I already mentioned (M10102).

At the time of the follow-up interview Em also discussed an aspect of the flowcharting process that she had not added.

> Oh, I forgot to put in the reflective component that's attached to each of these experiences. That's constant in each of those areas I just continue to question and relate the professional development experience back to my classroom practice. Will this work in my classroom, for my children? (M10102).

Stage 3 of Em's Flowchart

Figure 5



Focussing on stage 3 of her flowchart Em discussed the importance of my understanding the meaning of the dotted line across the process.

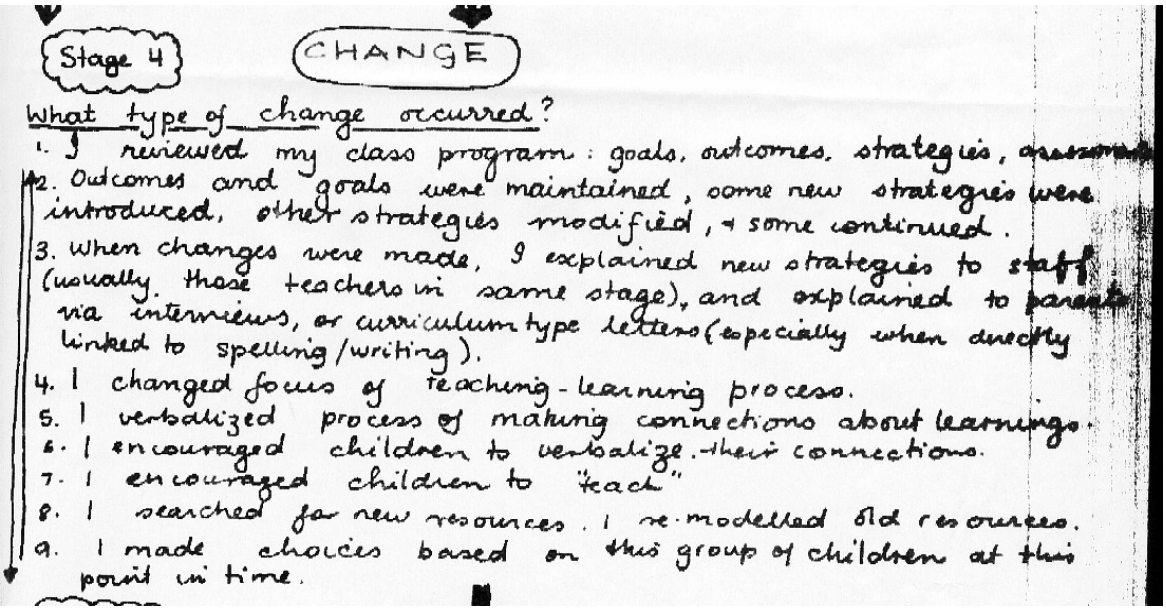
> This is a filtering process; I don't know what else to call it but it is linked with my analysis of the professional development experience. It works like a sieve. I run what I learned through a sieve woven out of knowledge about my classroom climate, the group of children that I currently have, my access to resources, the school itself, how I could assess and if it's practical. Some things just don't make it through this sieve (M10102).

Em discussed that this was at times a lengthy process that continued both in the classroom and also at home. The types of issues that impacted on this stage of the process were very practical ones connected to implementing the professional development experience into her classroom.

> I always ask myself a range of practical questions before I attempt to implement any change. The change has to be rooted in practice. I want to know things like what this will look like in the classroom? I like to get very specific even down to things like what types of language I would use, the types of questions I would ask, what the children will be doing. Other things I need to consider are how will any change affect the children, parent helpers in my classroom, my timetable, other teachers and the principal. If I can find positive answers to these types of questions then I can go into the next stage. But before changing I need a justification to change, that's why I ask myself those types of questions, then I can move onto the next step in the process (M10102).

Stage 4 of Em's Flowchart

Figure 6



Stage 4 CHANGE

What type of change occurred?

1. I reviewed my class program: goals, outcomes, strategies, assessment
2. Outcomes and goals were maintained, some new strategies were introduced, other strategies modified, + some continued.
3. When changes were made, I explained new strategies to staff (usually those teachers in same stage), and explained to parents via interviews, or curriculum type letters (especially when directly linked to spelling/writing).
4. I changed focus of teaching-learning process.
5. I verbalized process of making connections about learnings.
6. I encouraged children to verbalize their connections.
7. I encouraged children to "teach"
8. I searched for new resources. I re-modelled old resources.
9. I made choices based on this group of children at this point in time.

During interview Em discussed stage 4 of the process when some type of change becomes a concrete reality in the classroom.

> If the change doesn't work at this stage, that's OK. Because I have already justified to my self the need to implement change, I'm not too concerned if it doesn't work well the first time I implement it. I may have to go back to the analysis level in Stage 3 and re-think what I'm implementing. Sometimes I will go back even further, back to the professional development level in Stage 2. That could mean re-looking at the notes from the professional development, contacting the facilitators of the program, discussions with other colleagues who also attended the same professional development. Failures are quite good at this stage, they tell me what doesn't work (M10102).

Her flowchart reveals both the types of changes made in the classroom (points 4 –9) and how she communicated those changes to a range of other stakeholders (point 3). This portion of the flowchart also highlights both the scope of the review carried out (point 2) and the actual changes implemented (points 4-9).

When interviewed after the flowcharting process and using the flowchart itself as stimulus Em discussed these changes. When asked what she changed first,

> My attitude, I think that was the biggest thing. I re-looked at my thinking; you know I had years of experience behind me that led me to feel that I knew best how to teach. This was a turbulent time; I began to focus more on what the children were doing, on my role in the classroom. I made decisions about what I still did there that I felt was good (M10102).

Em discussed this change and how it related to the professional development experience

> It began with the professional development, something made me re-think what I was doing. Then I went back to the classroom and tried a few of the things we discussed and they worked. I thought and reflected again. Once my thinking changed, everything changed, the classroom environment changed (M10102).

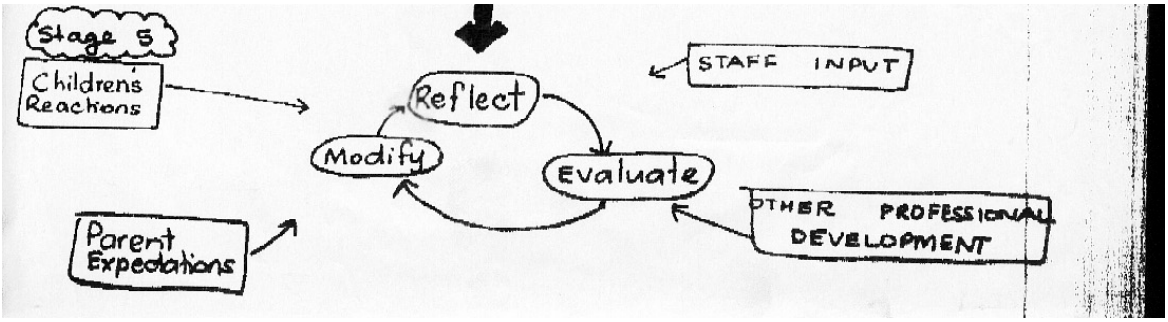
This change then flowed on into the classroom environment in a variety of ways,

> I changed the texts I used, I looked at the reading program we were using and why we were using it. I looked at the books, the grouping, and the timetable…some of this I kept. I looked at the environmental print that I used in the classroom. Was it at children's eye level, was the font big enough, was it clear? I changed the physical environment first, I used more colours. I re-arranged the types of proformas I used and made them much

more readily accessible. I discussed why I was doing this with the children. I used much more explicit teaching strategies, I did away with my assumptions about what the children knew. It became an even more child-centered classroom than it had previously been (M10102).

Stage 5 of Em's Flowchart

Figure 7



Recent correspondence from Em relates where she feels she currently is within the process that she has illustrated using the flowcharting procedure

> I would like to be able to show some kind of dynamic between stages 4 and 5. I feel that's where I am at present – moving from one stage to another. I am a little concerned at the 'appearance' of the process. The more I work on these drafts the more disconcerted I become. I don't believe it is a 'top to bottom' process. Anyway I shall keep thinking. I hope this makes some kind of sense. It just reinforces for me that the process is still evolving (M10102).

My Findings To Date

At present I am only part of the way through this process, but the flowcharts appear to have achieved their purpose. They have provided an additional lens through which to view the video data. Each teacher's flowchart contains a range of focal areas that can be directly linked back to aspects of their video data. I can identify and then use these areas to return to the video data for a deeper analysis; this also serves as a form of triangulation.

The flowcharts have served also as a questioning device. Teachers had already identified in their flowcharts the areas that they considered to be important milestones on their personal journeys to translate theory into classroom practice. Simply focussing in on these aspects and asking teachers for more detailed information provided me with more extensive data and a deeper understanding of their processes.

In their construction of the flowcharts teachers have graphically demonstrated what type of information and to what degree that information has been appropriated (Leontyev, 1981) from their professional development experience and how that information has been transferred into classroom practice.

For me, this has been a powerful experience. I have been privy to the mental models and reflective processes of a range of teacher participants. I have seen these expressed in the concrete terms of a flowchart and watched as through a draft and re-draft process these grew in complexity over time. At this stage of the journey I would concur with the thoughts of Dibble and Glaser as they discuss the use of flowcharting in their research

> Perhaps the most interesting theoretical dimension of our preliminary data is the strong influence exerted by mental models on both knowledge access and subsequent reasoning. Our results show that in this domain the primary content of transfer takes the form of abstract knowledge representations. Time and again we observed good learners access their existing mental models of equipment structure and function and of the troubleshooting task itself. They then used these models to guide their performance as they crafted solutions to new problems. Their prior models became interpretive structures, and when these models were inadequate, better learners flexibly used them to interrogate the expert and as the basis for transposed and elaborated structures that could accommodate the novel situations (1993,p.286).

Although my research is far from finished and flowcharting is a minor aspect of it, I feel it could be an important instrument in professional development. It has a range of advantages. These include

- The flexibility of the process lends itself to a variety of professional development areas.
- It is a non-threatening process, as it delineates each participant's individual learning process there is no one correct answer.
- It is a simple tool both to teach and to learn and easily integrated as part of a professional development program.
- It is a reflective tool that promotes discussion and stimulates questioning.
- Because flowcharting illustrates a facet of the current mental modelling or logical reasoning used in its construction, it also is obvious where the gaps in the theory- practice nexus are.

To return to the beginning and the Ramsay Report which discusses teachers, teaching and professional development thus

> Our very best teachers have embraced and created classroom practices which place them at the leading edge of their profession…they are adaptable and reflective and they constantly challenge the processes of teaching so that their craft is always improving (2000, p.25).

Through the implementation of this flowcharting process I have been an observer on the learning journeys of several teachers as they re-create their classroom practice to include aspects of a professional development experience that they consider to be vital to the learning of their students. The use of flowcharts assisted them to make aspects of this journey more visible to themselves and to others.

Annually in Australia hundreds of millions of dollars are spent on professional development and training. The ability to determine whether what has been taught

via a professional development experience can be transferred back to the working environment has long troubled those responsible for this training. Demonstrating that participants are able to construct a flowchart that illustrates that theory-practice nexus would provide a concrete example of this type of transfer. The type of flowcharting process discussed in this paper has application for professional development and training in a wide range of fields including those of education and business and also in the manufacturing arena.

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