E–Learning and Digital Media
Volume 7 Number 3 2010
www.wwwords.co.uk/ELEA

Teacher Professional Transformation Using Learning by Design: a case study

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ABSTRACT This case study of a senior teacher in an Australian high school describes the story of her professional transformation through involvement in the Learning by Design milieu. In so doing, it demonstrates how a pedagogical intervention under particular conditions can transform the learning of students and lead to deep learning. This article highlights the value that the skilled use of Learning by Design pedagogies, in combination with inclusive multimodal tools, can bring to improving education outcomes of all students. It also adds to the literature concerning the impact of researchers who work closely with educators to develop them as teacher-researchers. In so doing, it builds capacity in staff to then design learning that fosters a sense of belonging *in* the learning that in turn, improves the learning outcomes for their students.

Introduction

This case study describes the story of one teacher's transformation through involvement in the Learning by Design project, funded by the Australian Research Council (ARC, 2005-08). It highlights that under the conditions of an experienced senior teacher (referred to as CF) with expertise in the use of inclusive methods and tools, supportive school leadership, a dynamic mentor, peer collaboration, and intensive workshops with ARC researchers over three years, to develop the teachers as researchers into their own practice, the intervention of Learning by Design, with its attendant knowledge processes, resulted in transformed teachers and students.

Furthermore, I will not only show how CF harnessed the pedagogies of Learning by Design to improve the educational outcomes for all her students, but how her skilful and sensitive scaffolding of the knowledge processes also benefited those students considered to be underperforming. I will describe how CF utilised these eight knowledge processes or pedagogies to foster a sense of belonging *in* the learning in embodied and multimodal ways.

I begin by outlining the context of CF's intervention, her approach to teaching and the support her school lends in order to indicate the contributing factors necessary for her successful engagement with the ideas of Learning by Design and its construction of a milieu. I then proceed to describe and analyse CF's self-reflexivity through an analysis of her Learning Element, E-Learning Symposium presentation, semi-structured interviews and film-based data that articulate her enactment of Learning by Design. I will highlight the significance of the knowledge processes or pedagogies for addressing diversity – that is, addressing the individual needs of all students in her class. In so doing, I will elucidate how CF's presentation not only demonstrates a keen analysis of her own practice – her metacognition as a reflective practitioner – but sheds light on the transformative nature of both her learning and that of her students with reference to student work samples.

As an example of this meta-awareness and new professionalism, CF proceeds to analyse the achievements of her class in comparison to that of a colleague, who failed to understand the coherence and designed purpose of the learning design and thereby failed to address the needs of

 http://dx.doi.org/10.2304/elea.2010.7.3.280

her students: her colleague produced work that showed a lack of understanding of the topic and omitted key parts of the design, which resulted in superficial learning since her students clearly lacked an understanding of the purpose of their learning. Lastly, I will show how CF's own conclusions are validated through my analysis of her Learning Element, which scaffolds the learning and ensures that all students are academically engaged.

I worked closely with and am indebted to Dr Peter Burrows, since the ideas, content and research methodologies reflect our shared journey. The article draws on empirical data gathered at workshops using film, audio tapes, teacher presentations, semi-structured interviews and Learning Elements.

Belonging in the Learning by Design Milieu

CF is an experienced high school teacher in Canberra, Australia. She described herself in the following way:

> I really enjoy working with teams and feel my best work is produced this way. I work at Meadowbrook High School [a pseudonym], where I have been teaching for 10 years. I have been teaching since 1977, almost continuously with two breaks to raise children and two breaks to try different careers. Since coming to Meadowbrook, I have rediscovered a passion for teaching. I have always enjoyed being a teacher. I enjoy the interaction with adolescents and enjoy my subject areas of English and History. As I draw energy from the individuals around me, I *love* the energy of adolescents and I love the energy that high schools generate.

The ARC Learning by Design project, set up to test the efficacy of Kalantzis & Cope's Learning by Design theory, perhaps unsurprisingly attracted teachers who relished the challenge of change and who recognised a need for, and were receptive to, a rigorous and sustained professional development program. This is evident in CF's following statements: 'I draw energy from the individuals around me'; 'I am a very active teacher, enjoy taking challenges and change within my teaching and classroom practices'; and 'I try to support my colleagues through sharing of resources, strategies and student management techniques'.

Figure 1. Four teachers and the Learning by Design logo.

At Meadowbrook High School, CF developed a close working relation with other enthusiastic adopters of Learning by Design, including two other senior teachers and one newly qualified teacher. The collaboration of these four teachers is revealed in a photograph depicting the group, in which three teachers point to the projected knowledge processes logo that bisects the male teacher's torso in perfect symmetry. Their embodied and multimodal representation acts as a powerful metaphor for their belonging in the project, as seen in Figure 1.

It is significant that the cluster pedagogical mentor (referred to as MH), known affectionately as 'an angel at my shoulder' or somewhat mischievously as 'mother hen', has her office at the same school. The close and convivial relationship between MH and her teachers was to prove a significant factor in the success of Learning by Design in her cluster of schools. MH viewed Learning by Design's pedagogical framework as inclusive and it could thereby address the needs of her schools whose students were seen as underperforming, with many coming from low socio-economic backgrounds.

CF was attracted to the way Learning by Design's heuristic combined with other inclusive thinking tools associated with cooperative learning – for example, 'Think–Pair–Share', an activity that demands all students participate and provides a pathway to achieving deep learning for students. She stated: 'The reason for some of my dissatisfaction was that kids were just doing it, doing school ... so once you get into using those knowledge processes you do ensure rigour in your classroom.'

By ensuring rigour through the knowledge processes and scaffolding the learning so that the pedagogies build upon one another according to a student's 'zone of proximal development' (Vygotsky, 1978), CF and other teachers are transforming their students – in the words of Mary Kalantzis: 'there is no learning without student transformation'. In this transformed practice, students consequently belong in the learning since the learning environment demands their engagement. In so doing, I will discuss how CF successfully tackled student underperformance through her planning and enactment of Learning by Design's knowledge processes, which incorporate a bricolage of inclusive thinking tools.

The aim of CF's Learning Element, 'The Importance of Anzac Day and the Gallipoli Experience to Australians' (teacher resource) and 'What's So Important about Anzac Day?' (learner resource), was to produce a letter that demonstrates awareness and empathy from the perspective of an Anzac soldier from the First World War. Through an analysis of CF's symposium presentation, Learning Element, interviews and other film-based data collected from workshops, I will demonstrate how CF achieves transformation in her students.

The Teacher as Reflexive Practitioner

In early 2006, in a Learning by Design workshop held in Canberra, a group of Royal Melbourne Institute of Technology (RMIT) University researchers, high school teachers and their mentors discussed the significance of the knowledge processes as outlined by pedagogical theorist Mary Kalantzis. The teachers discussed what the knowledge processes meant to them and in addition their significance for their practice. In particular, they discussed the what, the why and the how of class activities' 'fit' with the knowledge processes. One experienced teacher, who was also part of the ARC project, linked her utilisation of the knowledge processes with the deeper understandings and metacognition of students concerning the purpose of their learning.

This was arguably a significant moment in this group's professional development as the teachers were confidently critical of their own practice and reflected on the implications and consequences of using the delineated knowledge processes or pedagogies in their classrooms. Demonstrating a confident criticality, a product of working with the framework and the manifestation of a transformed teacher, CF picked up on the Learning by Design framework and argued that a teacher has to use all the knowledge processes:

> What teachers do is the *experiencing and the applying*, but what we don't do is the *conceptualising* and particularly the *analysing* and it's from that you get your deeper thinking, reflections, understandings and intellectual rigour – that's the whole point of Learning by Design. (Original emphasis)

Thus, at this early stage in the research project, CF was able to clearly identify and articulate the significance of the knowledge processes as crucial to her teaching practice, and the practice of others.

Like many of the teachers in the project, CF identified the 'analysing critically' knowledge process as being hitherto omitted in most teachers' practice, but she also highlighted the knowledge processes of 'conceptualising by naming' and 'conceptualising by theorising' as being of crucial importance. A brief aside is necessary here to signal the pedagogical inclusivity of Learning by Design, i.e. its ability to harness both so-called traditional and progressive educational paradigms and to employ them not in terms of their binary oppositionality, but rather in terms of their complementarity and relationality. Thus, this form of teacher-centred 'chalk and talk' becomes, in the hands of CF, a productive pedagogical tool that weaves through the learning and supports analytical work, allowing the students to access deeper levels of understanding and knowledge.

At a workshop in March 2007, whilst discussing the diversity of student engagement, CF outlined the essay writing task she set for her students, the last activity in her Learning Element. She stated:

> What they had to do was to write a letter as if they were a soldier at Gallipoli. They had a list of things they had to mention including: Why do you write letters? How [do] you set a letter out? What's the purpose of sending a letter home when you're a soldier? At 9.20 a.m., it was the first lesson, I said, 'Right, this is a rough copy. We'll keep writing until 9.45 a.m.', as I thought 25 minutes would be all they would be able to maintain. So at 10 a.m., while they are all still busy writing, I asked, 'Does anyone want any more time?' They all said 'Yes', so we went on for another 10 minutes. Now, every kid sat in that class and wrote for that entire time. That's 50 minutes of writing time! They wrote and wrote and wrote, and they are the best letters from this unit of work that I have taught before but modelled into a Learning Element. They were just awesome! The lowest-performing student (and he's not low performing because he can't think but because he hates to write and withdraws from everything), even he wrote and sat there and persevered for that entire time. There was not one student who didn't take into account the prior discussions concerning the appropriate tone, manner and phrases that were commonly used at the time, for example, 'I really miss your home cooking'. They had got the flavour from the scaffolding that had been covered in the Learning Element. The students did a reflection sheet and many of the students wrote, 'I wish we could do some more work on World War One'. Whilst my enthusiasm for the topic was evident from what I put into it, they really enjoyed it.

The fact that every student was so engaged in writing and that the low-performing child 'persevered' is evidence of academic engagement. CF also commented that in addition to this inclusive writing task, the learning flowed over into another class where the students produced monologues and performed them to the class. They were able to do this because, as CF argued, 'they knew the topic so well'.

This poses the question: Just *how* did the students get to know their topic so well? CF went some way to explaining this herself during her presentation at the 2007 E-Learning Symposium in Melbourne. She reiterated the principal concern of this case study: how Learning by Design enables a teacher to plan, teach and reflect on a unit of work that brings all the students into the learning and achieves improved student outcomes.

On introducing herself to the symposium audience, CF stated: 'I teach a Year 7 class. I've been involved in the ARC project from its beginning and I love teaching at Meadowbrook High School – it's a great place to be, great staff!' CF's introduction is revealing since she loves teaching at Meadowbrook after stints in different schools, as the staff are well supported by mentor MH and the school leadership. Planning is thus not done individually but is rather approached as teamwork. In this learning community that is so empowering, the planning process is clearly a social process, one that 'entails learning as an integral constituent' (Lave & Wenger, 1991, p. 35), so that learning in this context is a social practice embedded in the teacher's lifeworld.

CF stated that whilst her teaching of Anzac Day had been successful in the past, this time the sequencing of learning experiences was changed:

> In the past we had gone to the War Memorial. When you live in Canberra it is a fantastic resource, and we had always done it at the end, but because of the framework we did it at the beginning. That was the first big change that happened – it was just wonderful as everything hung off that visit to the War Memorial. The kids had a good day. From the experiential phase, we moved into the conceptual and analytical learning activities. We did a lot of input and talked about a lot of things. We then had a look at some letters. This one was on the Smart Board but we also had copies of the letters. So we read, talked about it and they added material from the word chart, etc.
>
> Then they had a choice of letters, where they had to do a task of pulling various aspects out of the letters, looking at things they didn't understand, words that were unfamiliar, etc. And from this we created an interesting [Code Breaker] word chart, where kids had to have a guess at the meaning and then talk about what do you think this letter means within that context, within that sentence, and so on. We looked at the slang, we discussed the old-fashioned slang that students picked up from their families or from television. So we then said, 'What are letters about?' 'What are in those letters?' 'What sort of language do we see in those letters?' And the kids did a placemat activity. So what we're doing is building up the scaffold of this understanding, so we're constantly building on our knowledge.

Thus, the sequencing of the knowledge processes – particularly the early timing of the excursion, 'experiencing the new' on the second day of the school term – provided the students with plenty of experiential learning that they could refer to throughout the following six weeks. This sequencing allowed CF to scaffold the learning and addressed diversity by employing multimodalities in the classroom through a combination of inclusive thinking tools. These multimodal, embodied strategies include Think–Pair–Share; Point, Evaluation, Conclusion (PEC); Pros, Cons and Questions (PCQ) and Plus, Minus, Intriguing (PMI):

> The PEC, PCQ and PMI are all thinking tools that combine to consolidate the conceptual and analytical skills and knowledge. It makes the learning multidimensional and richer by promoting students to think in other ways. The students come up with the most amazing questions – you don't come up with it! At this stage the teacher is not working and thinking ahead of the kids. During these times the teacher can listen in to the conversations and intervene when and where appropriate.

The social dynamics involved in managing subtle transitions between individual, small-group and class work often require CF to 'step aside' and allow the students to exert agency as significant actors in their own learning, which encourages further engagement and a sense of belonging to the learning. Rogoff et al (1996, p. 388) remind us that it is the teacher who is responsible for the students' learning and it is the teachers 'who will provide leadership and assistance to the less skilled learners as they engage together in a community of practice'.

CF makes extensive use of retrieval charts that, whilst principally supporting underperforming students, teach all students valuable skills in information collection, analysis and retrieval. In this supportive environment, CF encourages students to add to their charts during the discussion:

> Charts are an ongoing building. Retrieval charts can be divided into sections and easy for students to locate information. It's another skill as well and is easier for underperforming kids as it's a heading that might be written in a different colour or underlined, and is thereby another inclusive strategy. Mostly information is in the form of dot points and key words that can be employed if quizzed on the topic: 'You'd be able to remember the key word and explain that to me, wouldn't you?'

These inclusive tools are orchestrated by CF under the purposeful intent of the learning design to achieve student engagement, cooperation and intellectual rigour as the students construct their own questions and knowledge and share it in their small groups. These groups report back to the class, thereby ensuring that every student in the class has had a voice in the learning. In this way, the students *belong to* the learning, since they have ownership of it. In other words, CF fosters an attitude of openness, collaboration and participation, what Resnick et al term 'socialising intelligence' (quoted in Kalantzis & Cope, 2001, p. 58): a socialising effect which proclaims that learning is to be inclusive and participative. In so doing, it is a far cry from students who are so

protective of their work that they put up a barrier (of a large book) to shield their own work so as to protect it from the gaze of others.

In an interview in June 2008, CF described the responsibility these tools place on the students and the importance of talk in her classroom:

> They talked to each other. They know that their role is to talk to each other and they know that they have a responsibility to the group, which is accountable to the class. The students know this because they are used to the routine. So the placemat strategy is great for engaging all of the students – it is inclusive as everybody is involved – it's the talk! The placemat activity involves all of them and they all have to come up with a strategy and they all have to come up with an answer as a group allows – it's inclusive, everyone is involved – it's the talk and discussion that is productive.

An analysis of CF's Learning Element reveals her deliberate use of a suite of inclusive thinking tools purposely crafted and drawn together by a through-line, which ensures not only student engagement but also intellectual rigor. MH argued that the Learning by Design pedagogies were responsible for inclusivity. She stated:

> The inclusivity to me is the cumulative building of an understanding that the knowledge processes give you, and you require the through-lines to do that. When the through-lines are present in your building, then your practice is transformed and you are addressing diversity.

CF identified this student talk as far more productive than teacher talk when a teacher talks endlessly *at* the class:

> We all do! Listen to my wonderful knowledge, blah, blah ... But crucially this is where you stand back and get them to feed back and articulate their understanding by feeding off somebody else, and they begin to discuss and go deeper into the learning. If I was standing up there, they wouldn't have responded in this way.

Thus, spoken language is valued in CF's classroom as yet another inclusive strategy, rather than always insisting and relying on the written word for evidence of student understanding.

CF's use of the participative mode, which is clearly apparent in the embodied activities undertaken in her classroom, is also extended to her use of the electronic whiteboard. In this case, the 'interactivity' of the whiteboard relates not to the technological affordances of a whiteboard (though the capacity for student engagement and learning through such technology cannot be underestimated), rather the board's interactivity is precisely its capacity to engage all students in a discussion of the structural and linguistic features. Furthermore, this activity takes on a performative function to foster relationship building and a sense of belonging for students. Indeed, students in CF's class demonstrate their belonging to the class and to the learning as they come out, one at a time, pick up the pen and draw all over the board. In so doing, this performance provides opportunities for students to articulate different ideas and approaches to the topic, thus valuing student voices. Students are encouraged to 'fill in the gaps' and also to apply this knowledge individually as a PEC paragraph.

On asking CF how the tools relate to the Learning by Design knowledge processes, she replied:

> What do I want them to know? What do I want them to get out of it? I analyse what I want the kids to get out of the learning, then I go and look for a tool that enables this to happen – by looking at the chart of tools. Will that provide a tool for thinking? If it doesn't, then we discuss what needs to be done before, etc. It all hinges on what I want the end product to look like.

A Loop Analysis of the Learning Element

A visual representation or loop analysis of CF's Learning Element, whereby the weaving of knowledge processes is mapped graphically, confirms CF's emphases on the conceptual, and particularly the analytical, pedagogies. This sequencing analysis also reveals the continual return of these same pedagogies.

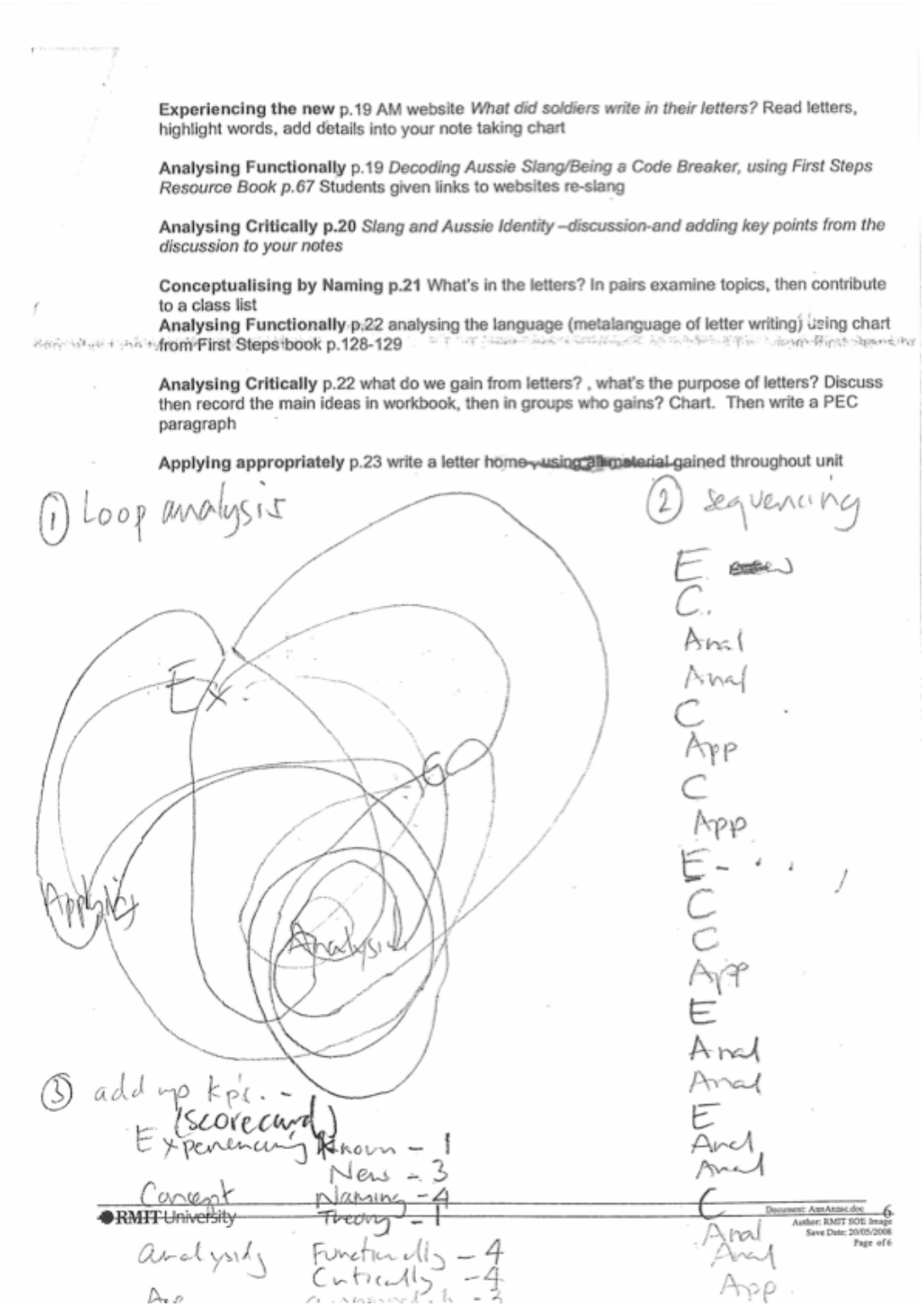

Figure 2. Loop analysis.

It is arguably the designed scaffolding, manifest in the constant reinforcement of the conceptual and analytical pedagogies that provide the opportunities for students to learn and incorporate new knowledge and *play* with these concepts, that allows the students to then deal with complex questions – for example: 'Why write a letter from (the front) home?' 'Who does it benefit?' This

emphasis on the analytical mode thus allows for students to go deep into their learning. Tellingly, the teacher used by CF as a comparative study omitted this crucial aspect of the learning. This teacher appeared to 'cherry-pick' aspects of the Learning Element because she simply did not understand the content and its relationship to the purpose of the learning. Since crucial aspects of the element were not taught, they could therefore not be revised prior to the 'applying appropriately' knowledge process.

One student in CF's class demonstrated his deep understanding of the learning by not only Adopting the appropriate structural and language features of letter writing, which begins with context-appropriate language – for example, 'Dearest Mabel'. This student, who was described as low performing, showed that he understood the task since he knew that the main reason for a soldier to write a letter home from the front was to reassure his wife: by complaining about the food and flies rather than alerting her to the horrors of war, he thus made light of his predicament. Thus, this student achieved the outcomes in the assessment rubric where CF describes what this empathy looks like – for example, content reflects the purpose of letter writing in wartime, such as reassurance, news from home, pride, etc. Another student fulfilled the criteria by employing humour to show empathy:

> My cobber Mick says anything is better than the Anzac wafers we've been on the last 3 weeks. These Anzac wafers are like nothing else. Some Tommys reckon they are so hard that you could use them to stop Turkish pills. Our sarg actually broke one of his teeth off yesterday when he tried to have some breakfast.

Whilst the former student, who was described by CF as a low performer in literacy, showed his transformation as a learner, a high-performing student in the class where the teacher had failed to grasp the learning purpose wrote: 'At one stage I turned around and saw many soldiers young and old lying face down in the water with blood all around them ... the Turks were shooting at us like crazy.' Not only did this student not understand the appropriate tone and language features – for example, 'shooting at us like crazy' is not context-specific language – but by describing dead bodies 'lying face down in the water with blood all around them', this student did not understand, and was clearly not taught why, this language might be inappropriate. By comparison, in CF's class, the students had collectively prioritised their reasons for writing – to let them know you are OK, reassurance, etc. – as part of the 'well-oiled machine' (CF).

The Learning Element: mapping the learning activities to the knowledge processes

The knowledge objectives of CF's design ('The Importance of Anzac Day and the Gallipoli Experience to Australians') were set out for each of the knowledge process areas:

Experiencing

- Read effectively and view a range of information texts.
- Gather evidence on a visit to the Australian War Memorial about the experiences of soldiers at Gallipoli.
- Contribute to group effectiveness by:

– displaying concentration and flexibility in allocating and undertaking varying roles and tasks in groups;
– acting in ways that respect and support the ideas and feelings of others;
– using effective strategies to achieve clarity of communication.

Thus, the emphasis in this knowledge process is both experiential and about building social cohesion and productive learning relationships in the classroom.

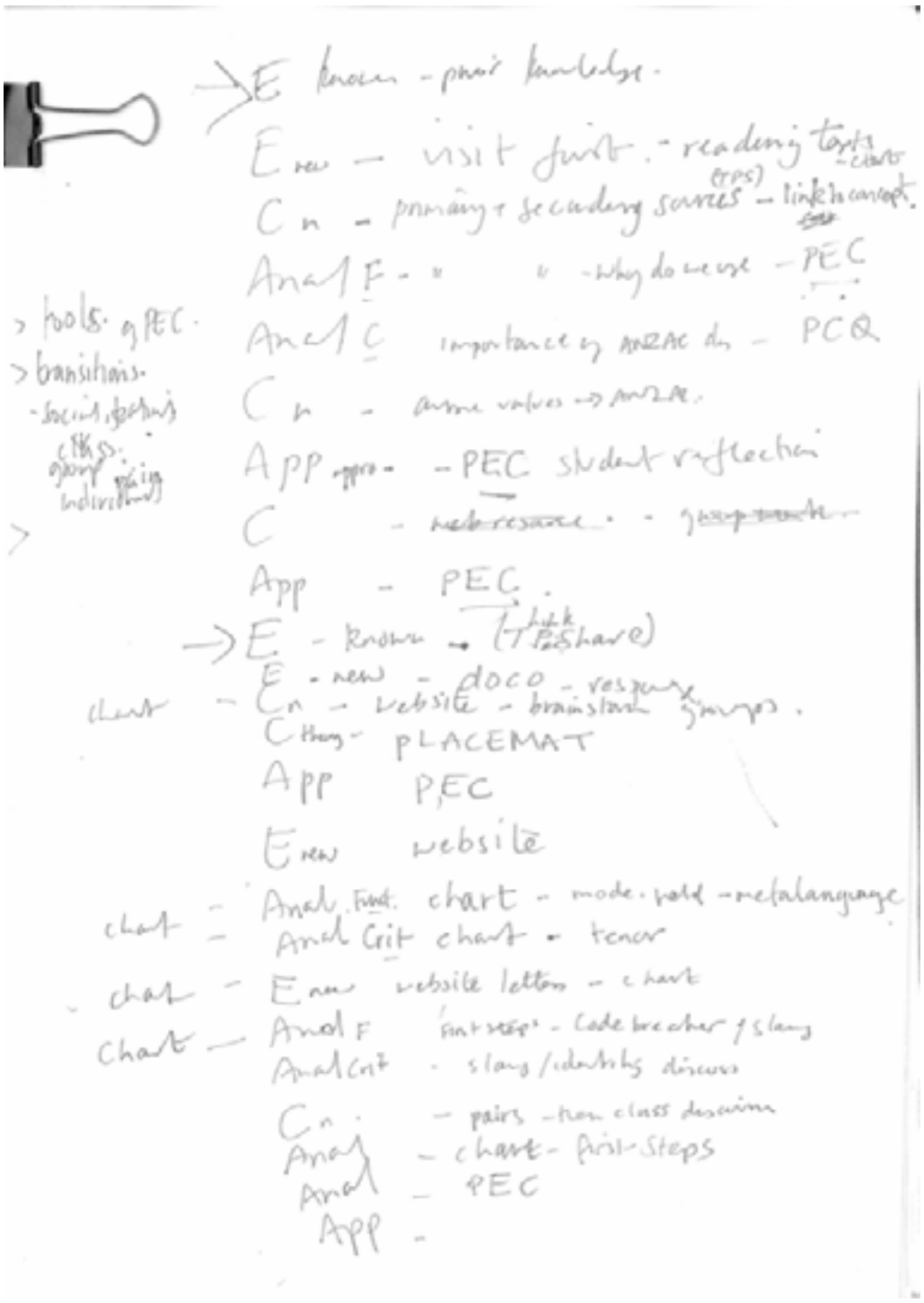

Figure 3. Sequencing the pedagogies.

Conceptualising

- Read effectively by:
  - understanding slang terms, military terms and other terms associated with war and commemoration;
  - defining primary and secondary evidence.

- Write effectively by:
  – developing code-breaking skills through word study;
  – finding out about, discussing and evaluating historical genres, sources and evidence;
  – taking notes from print and electronic media, and selecting and synthesising relevant information from a number of sources;
  – understanding how writers draw on their knowledge, experiences, thoughts and feelings, and on subject matter and text forms.

This knowledge process includes the naming and theorising of the terms and concepts. As such, *conceptualising* contains the crucial knowledge and skill development necessary for the deeper thinking required in *analysing*.

Analysing

- Understand about Australia and Australians by:
  – analysing the impact of Anzac Day for Australians, past and present;
  – understanding and learning about the factors that can influence and perpetuate identity;
  – understanding and learning about the values reflected in national celebrations.
- Reflect on the importance of letters to and from soldiers at war.
- Read and write effectively by:
  – understanding and learning about language features and structural features used by authors to engage the reader and express the author's opinions and to write argument and information texts;
  – recognising technical terms and subject-specific words in information texts and using resources to check meanings.
- Critically interpret and construct texts by:
  – looking at ways in which recruitment posters influenced people's views;
  – analysing how the creators of recruitment posters selected ideas and information to support their position and purpose.

In this knowledge process, CF plans to achieve deep understanding because of the extensive scaffolding that enables students to understand fully the purpose of the writing task.

Applying

- Write effectively in PEC paragraphs.
- Critically interpret and construct texts by selecting aspects about life at Gallipoli to portray people, places and events in ways that will appeal to the audiences back in Australia.

On adding up the knowledge processes as a scorecard, it was revealed that the Learning Element focused on largely new knowledge and its associated ideas, and their incorporation into the student's lifeworld. 'Experiencing the known' was introduced twice – 'often two experiential activities will do, as long as they're the right ones' (CF) – once at the very beginning to ascertain the prior knowledge of the students. This is a feature of the enactment of Learning by Design that allows the teacher to 'recognise what they know about the subject and affirming their knowledge, making them the expert and you're also ascertaining for yourself where the students are' (CF). This pedagogy is used again a little before halfway into the learning and thus acts to consolidate the student's learning, as a form of revision of the knowledge that has now become a part of the student's lifeworld.

> Experiencing the known as a recap goes from new knowledge to known knowledge. The students are now belonging in the learning at every point through talk and discussion. They also own the tools of the 'well-oiled machine', as they all know how to use the tools. It's not hard to participate. (CF)

Conclusion

In an interview in 2007, CF reflected on how the Learning by Design heuristic had been critical to achieving the learning goals for all students:

> The structure of my design contributed to the end product being so much better – they were really engaged. It's an interesting subject for most students about Gallipoli and Anzac Day, but their depth of understanding was immense. Going on their excursion to the War Memorial, the experiential learning happened right at the beginning, whereas before, we would be going halfway through the topic, even at the end of the learning. It made it more purposeful as I had to think, 'What's going to be *experiencing the new*?' We went to the War Memorial! We went the second day of term and all the way through we said, 'Remember that at the War Memorial', 'Oh, I saw that at the War Memorial.' That experiential learning consolidated a lot of things. When it came to writing the letter, because I had done all the scaffolding using the Learning by Design framework, they just sat down and wrote. They didn't want to stop because they had so much they could write about. That was a definite 'Ah ha' moment for me, that occurred as a consequence of my design. The framework makes you start with experiential learning. It sets the tone and it came through all the activities that we did. It was just fantastic! I had taught the subject a few times before, so I could compare it to how the learning went before. The excursion was a constant reference point throughout the learning. For example, the students remembered particular details – for example, the flies on the jam and biscuits, etc. – and this contributed to much deeper learning.

CF's self-reflexivity, specifically her identification that the experiential domain is a 'hook' for engagement that facilitates students' access into the conceptual and analytical domains, had significant implications for her practice:

> This means in the future we must concentrate more on the analytical and conceptual aspects of learning. We say, 'What's a really good way to get the kids to think analytically?' In the past, we might have just used the text of a speech to analyse but now we can go into it a deeper way by looking at film. We looked at use of repetition, body language, so the kids got it. So the multimodal of features of a speech were used by students to learn the tropes of this genre. The analytical learning has been used to get that deeper understanding through harnessing the tropes of multimodality. The analytical mode has been a gap in my teaching and probably in others' too. The conceptual stuff, the naming, is really important. I like getting the kids to name and then theorise about the concepts. They get a lot out of that as well. Even though I say that analytical learning has been a gap, it's been for me the hardest aspect to write and think about, and getting other teachers to understand the importance of going through all the steps as each step builds on the other, but also they make sense of the whole thing, and then to the applying stage, because that is the evidence, and if you don't go through the steps of deep thinking, then you do not get a good product at the end in the applying.

A key agenda of Learning by Design which emerges from CF's analysis is a requirement that she demands the students think analytically. In addition to fulfilling a pedagogical balance in a unit of work, this thinking analytically demonstrates the intent of the heuristic to what is termed 'new learning', whereby thinking skills are privileged over rote learning in a future workplace that requires critical and analytical skill sets in a globalised and information-saturated culture. This confirms MH's assertion that the knowledge processes of Learning by Design can collectively be viewed as, indeed, values-laden (Van Haren, 2008, personal communication).

Thus, CF argues that 'experiencing the known' and 'experiencing the new' at the start of a topic is crucial, as it allows students into the conceptual and analytical knowledge processes to achieve the learning goals. I concur with CF that the conceptual sphere 'is really important' since the process of 'conceptualising by naming' builds on the students' knowledge base as it provides a platform from which they can belong to the learning. Their understanding and sense of belonging deepens further during 'conceptualising by theorising' as they begin to interrogate aspects of the topic as they discuss, connect and compare these concepts in terms of theory. It is not insignificant that student belongingness is arguably a result of the construction of their knowledge and not the teachers' knowledge, even though this knowledge has been planned for by the teacher. Thus, Learning by Design co-opts the notion of student voice and agency under its heuristic in a way that

genuinely allows for a diversity of student skill levels and modalities. Importantly, CF closes with the assertion that the learning goals of 'applying appropriately' and 'applying creatively' could not be achieved without the deep thinking demanded by an emphasis on the conceptual and analytical spheres.

CF also rightly notes that analytical thinking has been a common gap for teachers, who had previously omitted any analytical work and jumped from experiential to applied learning. Thus, it is 'the importance of going through all the steps as each step builds on the other, but also they make sense of the whole thing'. CF's main argument – that the conceptual and analytical processes of Learning by Design were crucial to the students gaining a deep understanding of the topic – appeared validated on a careful analysis of the data.

This enactment of Learning by Design requires tools that are inclusive, since they address diversity by bringing all students into the learning. Although CF and other teachers in the ARC project have used cooperative learning strategies and multimodalities in their past teaching, Learning by Design has reconfigured the coordinates of these practices and moulded them into a coherent and purposeful design.

Whilst Learning by Design's principles facilitate a shift in agency concerning student voice in a cooperative learning environment, they do so not by 'cherry-picking' activities and tools at random, or as a result of some form of essentialist student-centred idea of learning, but operate by viewing the learning through a set of pedagogical lenses that allow them to be purposefully designed and redesigned by the teacher(s). Learning by Design thereby provides CF with the pedagogies that prompt the following questioning:

> What do I want them to know? What do I want them to get out of it? I analyse what I want the kids to get out of the learning, then I go and look for a tool that enables this to happen – by looking at the chart of tools. Will that provide a tool for thinking? If it doesn't, then we discuss what needs to be done before, etc. It all hinges on what I want the end product to look like.

'[W]hat I want the end product to look like' is a powerful statement that asserts the teacher's responsibility for designing the learning, and this case study demonstrates the powerful ways in which Learning by Design prompts a teacher to think, plan, enact, review and share her practice as a teacher-researcher, and how her overarching concern for pedagogy and mulitimodality plays out in the classroom to draw all the students into the learning in order to produce deep learning and a sense of belonging in the learning.

By outlining the practice of a teacher and her practice as a teacher-researcher into her own practice, and by mapping the context, conditions and tools that enabled her transformation, this article provides insights into how Learning by Design contributes to notions of inclusive teaching and the construction of a new professionalism for teachers.

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