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Engaging Learner Diversity through Learning by Design

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ABSTRACT Diversity is a key issue in education not only because of ongoing inequalities in student learning outcomes but also because of the importance of supporting each individual to reach his/her potential to contribute to national economic prosperity, individual well-being and social cohesion. Through an ethnographical approach, this research investigates how the Learning by Design pedagogy, developed by Kalantzis & Cope, addresses diversity in two Year 8 (students aged 14 years) classrooms in Australia. Student and teacher perspectives emphasize the importance of incorporating students' lifeworlds and their individual attributes in learning designs, of scaffolding learning, creating student agency, including challenge and intellectual quality, and providing a metalanguage for students to participate in their learning.

Diversity and Learning by Design

Increasing local diversity and globalization, the impact of technology and ongoing inequalities in the educational outcomes of students provide challenges for teachers. In Australia, performance by students on the Organisation for Economic Co-operation and Development's Programme for International Student Assessment (PISA) indicates that students perform on a par with the best students in other high-achieving countries (Australian Council for Educational Research & Organisation for Economic Co-operation and Development, 2000; Thomson et al, 2003; Thomson & De Bortoli, 2008). However, the results also highlight issues of diversity as the relationship between socio-economic background and achievement is greater in Australia than other high-achieving countries. In the Australian results, there is a larger gap between the highest- and lowest-performing students. This underperformance by some students indicates that their needs are not being met through current educational practices and that education continues to work more effectively for some groups of students than for others.

Despite the rhetoric of educating students for the twenty-first century, many education systems, nationally and internationally, have responded to issues of diversity in performance through back-to-basics approaches and universal standardized testing (US Department of Education, 2001; Australian Government Department of Education, Science and Training, 2006). The diversity of students is defined according to gross demographics such as gender, language, culture/ethnicity, ability/disability, religion, socio-economic background or geographic location, with government investment in programs which focus on, for example, students with disabilities or abilities, indigenous students, boys, students whose first language is not English and students from low socio-economic backgrounds. Many of these responses have resulted in widening rather than narrowing the gap between performing and underperforming students. Apple (2006) states that such policies create differences and stratify even more powerfully by class and race. The perception is that because education is available to everyone, it must be equitable. When students underperform, the deficit is ascribed to them because they are seen to have missed or not taken the

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opportunities offered. Diversity in their experience is acknowledged primarily through educational practices that celebrate diversity and promote assimilation (Kalantzis et al, 2003).

While gross demographics are very useful to generate population data about students, they do not recognize the complexity of difference; for example, the intersections of gross demographics such as class and gender or gender and race create even more variation. Nor do gross demographics support teachers to address the individual attributes of students. This requires teachers to plan teaching and learning experiences that value students' lifeworlds and subjectivities – their interests, experiences, abilities, insights, needs, cultural and ethnic backgrounds, physical and cognitive abilities, learning styles and intelligences. For most teachers, this would cause them anxiety as it would seem to increase their workloads – it is much easier to teach to the middle or require students to assimilate. Kalantzis & Cope (2004) propose that Learning by Design offers a planning tool to teach at the individual level.

The Learning by Design framework was developed by Kalantzis & Cope (2004) based on the multiliteracies principles of diversity, pedagogy and multimodality. They argue that curriculum and pedagogy must address diversity through the transformation rather than the assimilation or integration of the learner (Kalantzis et al, 2003). The framework focuses on recognizing and harnessing the individual attributes of students in teaching and learning. It thus requires the purposeful deployment by teachers of appropriate pedagogies and meaning-making modalities which are inclusive of the diverse needs and ways of knowing of children.

Modern technologies require students to make meaning of a range of multimodal texts, as well as become knowledge producers/creators. Technology may increase the engagement of students in their learning but its mere provision will not support the diversity of learners. Only with appropriate pedagogical support will all students be able to become knowledge producers/creators. Effective teachers with a repertoire of pedagogical practices and knowing which practice to select are critical to address the diversity of their students and to prepare them to be active citizens in a democratic society. Through its knowledge processes of experiencing, conceptualizing, analyzing and applying, the Learning by Design framework has the potential to transform classrooms and curriculum, and to improve student learning outcomes.

This research is concerned with the ways in which the Learning by Design framework supports a range of practices which address the diversity of students in the middle years of schooling; in these years, issues such as engagement and underperformance are particularly challenging. The research investigated student and teacher perspectives on the ways that this framework enables teachers to address diversity, and how this, in turn, impacts on the learning of students to enable them to achieve equivalent learning outcomes.

Research Design

Using methods of ethnographic classroom research, the data involved a thematic analysis of the perspectives of teachers and students through semi-structured interviews (Minichello et al, 1995; Burns, 2000), audio recordings, a student survey, teacher and student reflections, researcher journal reflections and field notes, and teacher and student artefacts – for example, documentation of a Learning by Design Learning Element, pedagogical strategies and examples of student work. It also included member checking and triangulation with student assessment data.

Four students and two teachers participated in the research. All the students were in Year 8 (aged 14 years) and attended an Australian urban high school with a student population of 700. Approximately 33% of its students are identified as 'low socio-economic' based on the Australian Bureau of Statistics' Index of Relative Socio-Economic Disadvantage (IRSED). Data from state standardized tests indicated many uneven patterns of success and school mean scores that were below the state mean scores.

The school is part of a cluster of schools which have been trialling the Learning by Design framework as their pedagogical framework since 2004. The teachers in this research were middle-years teachers of English. One participant was an experienced teacher, having taught for 27 years, and had been planning with the Learning by Design framework for two years. The other participant was in her first year of teaching and it was her first experience of using the framework.

Working in a team of four teachers, they collaboratively designed and documented a four-week Learning Element entitled, 'Using Popular Culture to Explore Identity/I Can't Live without My…'.

The Students

The students were randomly selected based on the gross demographics of gender and ability judged by their performance in literacy in the state standardized tests and confirmed by school-based assessments. As socio-economic status and ethnic and religious factors did not differ significantly for the students, the diversity in this project focused on the gross demographics of gender and ability within one socio-economic and ethnic group. However, the students' individual attributes represented diversity through their interests, sensibilities, backgrounds and abilities. Initial interviews and ratings using the Multiple Intelligences Checklist for Adults (MICA), modified for middle-years students (McGrath & Noble, 1998), confirmed the diversity among these four students (see Table I).

	Student Male 1 (M1)	Student Male 2 (M2)	Student Female 1 (F1)	Student Female 2 (F2)
Family background	Both parents work Third born of three No religious affiliation Australian parents	Both parents work First born of two No religious affiliation Australian parents	Both parents work First born of three Church of England Australian parents	Both parents work First born of two No religious affiliation Australian and British parents
Interests/ lifeworlds	Computers Football Music World issues	Skateboarding Pet dog Music Cars	Music Reading fantasy Netball Horse riding	Sport – especially skiing and basketball Music
Preferred multiple intelligences	Logical Linguistic	Intrapersonal Interpersonal Kinaesthetic	Intrapersonal Kinaesthetic	Kinaesthetic Interpersonal
Academic performance	High – likes mathematics, reading and writing	Low – prefers and excels in practical subjects	High – successful in academic and practical subjects	Low – indifferent to most subjects except for sport

Table I. Student diversity in initial interviews.

The students were very similar in terms of their family and cultural backgrounds, and socio-economic status. What delineated the diversity most were the students' contrasting individual attributes. Their self-assessments of how they learned best varied from logical and linguistic strengths to kinaesthetic and intrapersonal strengths. Their interests ranged from skateboarding and sport to computers, music and reading. These interests represented student lifeworlds and reflected the interests of their peer or affinity groups (Gee, 2004). Student M1 aligned with the 'computer-heads', while Student M2 was one of the 'skaters'. Student F1 was aligned with the 'squares', while Student F2 was a 'sporto'. These affinity groups encapsulated a variety of beliefs, attitudes and behaviours.

In their interviews, the students articulated what was important to them in their learning. Responses included:

- *Connection to lifeworlds and learner subjectivities*. All of the students expressed the importance of learning being connected to their lives (Education Queensland, 2001; Comber & Kamler, 2005; Kalantzis & Cope et al, 2005; Hayes et al, 2006). Student M1 stated:

> I found a common link. It was easy to create. A subject like that links to me as a person and what I'm interested in, then I just find it quite easy. But with units of work that I don't like, I find it harder because there is no real link or common interest.

Student M2 also said:

> The timeline hooked me. It was different to what I usually do. It was new stuff to learn. It was about me and about the 1970s and your background. I found out more about me.

- *Scaffolded learning*. All of the students described how they liked the support teachers provided by scaffolding their learning (Ryan & Deci, 2000; Wilhelm, 2001). Student M1 said: 'What made it easy was I think my teacher has outlined a lot of things, making it clear and simple so it reduces the difficulty.'
- *Intellectual quality*. Three of the students stated that they enjoyed thinking and meeting intellectual challenges (Newmann, 1996; Education Queensland, 2001; Australian Government Department of Education, Science and Training & University of Queensland, 2003; Hayes et al, 2006). Student F1 brought out the importance of intellectual quality as well as student lifeworlds in responding to a question about whether she liked school:

  > Depends on what you are doing. If you are doing something interesting, like big projects or debates, seeing different points of view and asking questions. If I feel connected to it and know what it's getting at – what the point is ... It is easier to understand why you are doing it and you can actually put it into your life now; not finding out later.

- *Agency*. All of the students showed through the work they produced or in their interviews that they liked success, choice and working collaboratively; these all link to students having more agency in the classroom and results in students being more engaged and intrinsically motivated (Ryan & Deci, 2000; Raison, 2003; Kalantzis & Cope et al, 2005; Hargreaves, 2006). Student M2 stated that he liked working in groups where you could have a 'more open opinion; a lot of ideas are equal to one good idea and more information'. Also he emphasized the importance of choice: 'It was good because you could, like, choose the type of magazine ... Like, if we get a wider choice on the subject.'

The Learning Element

A team of four teachers identified specific outcomes to be included in their next Learning Element (unit of work), based on the state curriculum framework, *Every Chance to Learn* (Australian Capital Territory Government, 2006). These included outcomes to read and write effectively, critically interpret and construct texts, speak with purpose and effect, contribute to group effectiveness, and understand and value diversity. The content included exploring the use of technology for entertainment and communication, group identities, popular culture in the media and how these impact on identity. The teachers felt that they would be able to address diversity through both the content and through the Learning by Design pedagogy.

Experiential Learning

Connecting the learning to the diverse lifeworlds of the students was built into the learning design through activities such as creating timelines about their own use of technology in their lives ('experiencing the known') and interviewing their parents about their experiences of technology when they were growing up ('experiencing the new'). In doing so, the students were able to draw on their prior knowledge and lifeworld experiences of technology, going beyond the world of the classroom and making their own connections to the learning. Teacher B described this:

> In the experiential learning there were collaboration, discussion and listening. They know their own background and through the discussion, they became less inhibited. They were reaffirming what they knew. They had their own ideas but they were building on ideas and learning how to use others' ideas. It was like stepping stones. The popular culture topic was interesting to them and they were relating it to themselves. That would have hooked them in. There was also the challenge of doing their own timeline themselves and knowing they have to share that makes them accountable. Once they have shared and learned about others, their interest is stepped up and they can all relate to the topic more.

Through 'experiencing the known', the teacher provided 'access without children having to leave behind different subjectivities' (New London Group, 2000, p. 18).

Teacher B used terms such as 'building on ideas' and 'stepping stones' to show how experiential learning provides scaffolding. She also described how experiential learning is

collaborative – sharing, discussion and listening, and students have agency in this learning environment. Teacher A also used terms such as 'structure it', 'build it up', 'starting point', 'build', 'building on their knowledge', and 'the next step' to show the scaffolding of learning in experiential learning. This aligns with Vygotskian theorists, who argue that with scaffolded learning, students internalize the strategies and language connected with the learning, which then become part of the child's psychology and personal problem-solving repertoires (Wilhelm, 2001).

In 'experiencing the new', the students interviewed their own parents and they found out new information; their 'new' knowledge soon became their 'known' knowledge too. Kalantzis & Cope et al (2005, p. 48) describe this as: 'The place to which you travel becomes part of you, part of your repertoire of life experience, and in fact another aspect of your identity'. Teacher A also described the agency in discussion as students 'setting their own parameters'. In both classes, the students felt they belonged to the content and the learning setting of the classroom. This is one level of addressing diversity, for '[e]ngagement produces opportunities for equity and participation. Failure to engage produces failure, disadvantage and inequality' (Kalantzis & Cope et al, 2005, pp. 46-47).

The experiential knowledge process also offered engagement and scaffolding so that all students were able to participate. This engagement with learners' identities is described by Kalantzis & Cope et al (2005) as 'belonging'. They argue that 'effective learning engages the learner's identity. It builds on the learner's knowledge, experiences, interests and motivation' (Kalantzis & Cope et al, 2005, p. 51). Gross demographics such as gender and ethnic background can stereotype students, while individual attributes such as experiences, interests and interpersonal styles enable teachers to address learners' identities. Kalantzis & Cope argue that the realities of difference are represented through such individual attributes (Kalantzis & Cope et al, 2005, p. 51).

Conceptual Learning

In the conceptual learning, the students used Venn diagrams to compare and contrast the changes over time between their own and their parents' lives. This was a 'conceptualizing by naming' activity, and the students worked in groups of four to complete the task. It enabled the students to develop vocabulary to discuss the subtle differences between communication and entertainment and between recreation and transport.

Teacher A described how the students discussed and synthesized their ideas into one big idea. From this, they were able to draw conclusions and deepen their understanding of how technology impacts on their lifestyles. She described the scaffolding of learning by 'bringing it all together', 'going one step further', 'thinking more' and 'thinking in a different way', as well as sharing of ideas and listening to other perspectives, as important to addressing diversity; this became the scaffolding for the analytical section. Learner subjectivities were harnessed because the scaffolding gave the students the support to think, talk and develop their viewpoints and incorporate individual meaning making, while the cooperative learning structures ensured each student had the opportunity to have input by speaking and expressing his or her perspective. Being able to participate in this way opens up the curriculum to diversity. Further, the discussion (auditory) was centred on the placemat (linguistic), the Venn diagram (graphic organizer – visual and linguistic) and timelines (visual and linguistic), so catered for different learning styles. Meaning making in a variety of modes is also relevant for meaning making in new media.

Teacher B commented on the importance of conceptual learning to develop critical thinking, common understandings and a shared language as a basis or scaffold for further learning. The ownership, engagement and participation of the students, whatever their ability levels, were evidence of how the conceptual knowledge process addresses diversity. She stated:

> They learned about similarities and differences between their own lives and their parents' lives. They had to be critical, not just look at the information. They had to justify and use criteria to sort things. We also had to do some conceptual learning before we could do the experiential because we had some common understandings and definitions of technology, entertainment and communication. Once we had done the experiential, in the conceptual we were doing something with it. It was giving them ownership of the knowledge and showing its purpose. It helped them to make sense of it and put it into some order. In the 'conceptualizing by theorizing', they were

> applying their learning to their own lives about how technology affects their lives. Because they have already named, they now have a language to discuss and write about it.

Field notes confirmed the engagement of the students. It was also clear that the going back and forth between the three knowledge processes of experiencing, conceptualizing and analyzing was supporting the learners and building their understandings and positioning them as active learners. Further, not only were the teachers demonstrating their repertoires of practice, but they also knew which pedagogical move to make and when. 'Weaving' (Luke et al, 2003) purposefully back and forth through a variety of activities supported the diversity of their students to achieve the learning goals.

Student M1 encapsulated the importance of the teacher's pedagogical moves in his initial interview:

> I like her [Teacher A] because she gets the job done ... she comes in with a plan and she doesn't stuff around ... There's no ideal classroom for me. The classroom is just a room. The thing I would prefer is the ideal teacher.

The conceptualizing knowledge process derives from the 'overt instruction' of multiliteracies theory (New London Group, 2000). 'Overt instruction' does not suggest direct transmission, rote learning and drills. Such teaching will involve assimilation of the learner and the reproduction of what the teacher has presented. Mills (2006) found that when overt instruction became teacher-centred transmission, students were unable to use their own meaning-making resources and hence there was less likelihood of learner transformation.

Both teachers emphasized the importance of collaboration, discussion and listening for students to deepen their conceptual understandings. For Teacher A, the scaffolding of learning through thinking and cooperative learning strategies supported the students to conceptualize collaboratively and then form their own understandings of a concept. Strong et al (2001, p. 32) emphasize the increased role of collaborative learning in catering for diversity, but emphasize that students must still come to an understanding of their own along paths that are 'neither certain or prescribed'. The teacher addresses diversity by drawing out students' prior knowledge and then by building on it to deepen students' understandings of the concept, enabling students to draw upon their own meaning-making resources. Using discussion and a variety of texts – for example, visual and linguistic texts – the teacher is able to cater for a variety of learning styles. The most significant evidence that diversity is being addressed is that all students are able to access and participate in the learning, regardless of gender or ability, and are engaged in the learning. This differs from the classroom in which teachers provide students with fixed or uncontested definitions of a concept and the direction of the knowledge flow is from the teacher to the students along prescribed pathways.

Teacher A described student M2's use of grammatical terms in his essay: 'When you have that, using the metalanguage, then this is a place of learning. We are in a classroom and we are learning; we are talking, using the language of learning.' Having a metalanguage is also important for metacognition, which is another form of student agency (Bennett & Rolheiser, 2001). Language, indeed a metalanguage to talk about learning, makes it real for the student and is essential to understanding. Similarly, Vygotsky argued that the mastery of language is essential to transforming thinking and that this is not linked to a particular age but to appropriate instructional support (Wilhelm, 2001). In Learning by Design, this instructional support is provided in the 'conceptualizing by naming' knowledge process.

Analytical Learning

In the analytical knowledge processes, the students explored a range of texts, including magazines, media articles and essays. 'Analyzing functionally' enabled them to focus on the language and visual features of these texts. This supports students so they can create their own texts in 'applying'. It also enables them to understand the choices authors make to position readers in particular ways in 'analyzing critically'. They can then value a variety of cultural knowledges and perspectives.

Teacher A described how the analytical learning supports students at the applying stage:

> When we looked at the features of the magazines in conceptualizing – that led to the analyzing in how magazines influence identity. We were going back and forth between the knowledge processes, so when you get to applied, it's so much easier. And because of all the scaffolding, off they go; they are rearing to go with the applying.

In asking questions about whose interests are served in a text and how people are positioned by a text, students are empowered to critique the wide range of information that is available through the media and modern technology. This increases their agency not only in being critical readers in and beyond school, but also in the creation of their own texts, through which they demonstrate learner transformation (Gee, 2000; Comber & Kamler, 2005).

Engaging with the ideological is another aspect of intellectual quality. Cloonan (2007), using multiliteracies pedagogy, argues that through critical framing (analyzing), students learn to detach from what they have learned and critique the learning already gained through situated practice (experiential) and overt instruction (conceptual). Here, the analytical is building on the experiential and the conceptual. The role of critical framing is to deepen understanding by assisting students to denaturalize and assess learning 'in relation to the historical, social, cultural, political, ideological, and value-centred relations of particular systems of knowledge and social practice' (New London Group, 2000, p. 34). For example, Student M1 was able to see how baseless prejudice could be, especially given the similarities amongst people from different cultures. He saw his own interest in music and computers as something that people from other cultures might share. Interestingly, the students detaching from what they have learned in order to critique it leads to them identifying the relevance for their own lives and hence their lifeworlds (Haren, 2005).

Applied Learning

In 'applied' learning, students have to move beyond responding to creating and becoming knowledge producers. They were able to do so through a range of modes and media, and so a variety of learning styles were catered for, including the visual, auditory, linguistic, spatial and gestural (Gardner, 1993). Encouraging students to present their learning in different modes provides them with choice – another form of agency – as well as linking to their technological lifeworlds and subjectivities. Tasks included writing an exposition about the influences of popular culture; creating an illustrated timeline based on fashion, sport, cars, music, film and video clips, advertisements, art, etc.; designing an individual magazine cover; and presenting research in multimodal ways – for example, PowerPoint, website, role play, media report, visual representation, video, etc.

Teacher A, commenting on her students M1 and M2, felt that despite the difference in their academic abilities and subjectivities, both were challenged and supported in the Learning Element:

> Look at Student M2's magazine cover [Figure 1]. Visually his was the best because of the title, the background, the picture, the colour. He understood the layout and the genre. It's about skateboarding, which he is mad about. He could have done skating in his talk too, but because other kids were doing skateboarding, he chose cars. He put so much detail in his PowerPoint presentation. Some did posters but he chose PowerPoint so he could use the technology and put it on the Smart Board [interactive whiteboard]. For student M1, what mattered to him was the technology, as he put a lot of time on his background – the colour and patterns. This was the same in his talk, when he included a short video clip in his PowerPoint. I think that Student M1, in looking at his learning, maybe it was the research, was more reflective and thought more deeply. He is a deep thinker and when we got to the essay, he found it more challenging and he liked that. Yes, so the idea of having streamed or tracked classes; it doesn't matter [when you use Learning by Design].

Teacher B also discussed how her students were able to achieve the planned objectives:

> The students had to write an essay and for Student F1 this was the main thing she learned in this Learning Element. The essay suited both girls and the wide range of abilities in the classroom. I could really see that Student F1 was pushed. This was the same for another high-performing boy in the class who I am always trying to extend. With Student F2, I could see that she was

> scaffolded enough, so she could do the essay too. They all had the flexibility to move in the directions that suited them and it was structured enough so all knew how to do it.

Student F2 was quite unresponsive in an early interview in which she was asked to talk about her learning. This contrasted with the final interview in which she presented her completed pieces of work. Here, she felt she had achieved some good work and so felt more confident about sharing what she had done. In this interview, there was a greater sense of agency as she had chosen what to include in her essay and magazine cover. Her comment that she felt that she had 'learned stuff out of all of it' showed she had engaged with the learning process and had moved from indifference to becoming an active learner.

Figure 1. Student M2's magazine cover on skateboarding.

Like Student M2, success had made her feel more positive, and this was demonstrated in a much more cooperative attitude in the interview. Her feelings of competence had made her more interested in the work. The final products of Student F2's work in this Learning Element do not triangulate with her responses in her early interviews. Her magazine cover (Figure 2) showed her understanding of layout, colour, slogans and using emotional appeal. Her essay showed that she had analyzed positive and negative impacts and so had engaged in some deeper thinking. She made the strongest connection to sport in the essay and said she was not really interested in celebrities and magazines, so clearly the learning did engage Student F2 more than she was prepared to acknowledge, and the link to her lifeworld through sport was significant.

Overall, when you work through the knowledge processes you are scaffolding for increasing agency for students – so when you ask students to apply their understandings and learning, they will be more successful. Student agency was demonstrated in the varied ways the students presented their magazines covers, timelines, collages, research, oral presentations and essays. Effective transformation requires a shift in the balance of agency from the teacher to the students. Zou & Trueba (2002) describe the importance of agency through Willis's theory of praxis. Willis argues that the level of alienation/engagement is dependent on the level of self-expression possible in a given environment. The evidence indicates that when teachers gave up control and scaffolded the agency of students through the knowledge processes, students took up this opportunity for autonomy and their learning was transformed. This transformation is more than assimilation and just moving to what the teacher wanted the students to learn.

It also is significant that the agency is created through the teaching and learning. Schools and teachers invest a lot of energy into developing agency through student voice in leadership, student councils, citizenship and extra-curricular activities. While very worthwhile, they are often only taken up by a small group of students. When the agency is embedded in the teaching and learning,

then it is available to all students and is another powerful way of ensuring inclusivity and addressing diversity.

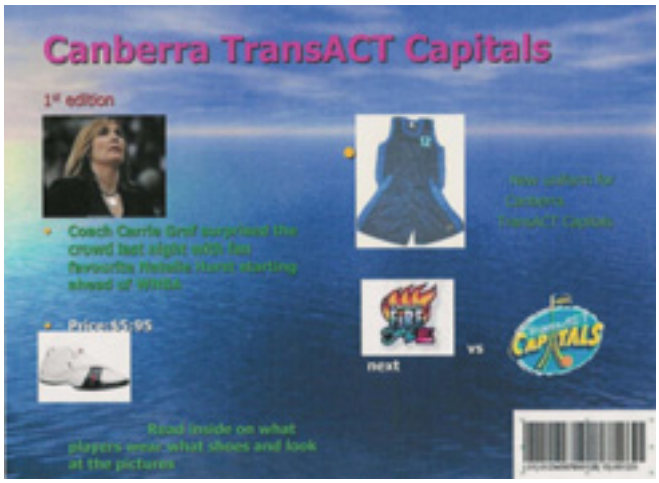

Figure 2. Student F2's magazine cover on sport.

Assessment and Learner Transformation

By being able to demonstrate their learning in a variety of ways, the students achieved equivalent outcomes, as evidenced in their timelines, essays, research reports, oral presentations and in the design of their posters/collages and magazine covers using a variety of media and modes of presentation. There were many indicators of student learning in terms of their skills, sensibilities and knowledge. The students developed their skills in collaboration and group work; problem solving and thinking; investigation through interviewing and research skills; literacy, including reading at the literal and inferential levels of meaning; writing; speaking and listening; and critical literacy and reflection skills. In doing so, they often went beyond their preferred intelligences. Students F2 and M2 did not rate themselves highly on linguistic intelligences, yet completed an essay. Student M1 did not rate himself highly in the interpersonal intelligence, yet contributed to group interactions and gave an oral presentation to the whole class. This also demonstrated changes in their sensibilities. Student F2 become more confident and started to see herself as a learner in her English classroom; Student M1 also gained better understandings of himself as a learner in the subject English – he commented that after the research project, he felt much more confident and saw himself as being just as competent in English as he saw himself in mathematics. Student M2 showed his most significant change in how he engaged more confidently in English, while Student F1 gained greater understandings about herself as a learner, particularly how she liked meeting and overcoming challenges.

The students also gained new knowledge about the differences between technology used for communication and technology used for entertainment; about their personal histories, through interviewing their parents and reflecting on their own lives; and about human diversity and how peoples' identities are shaped by and reflected in appearance, interests, peer groups, language and culture. Through their individual research projects, the students explored areas of interest in more detail and gained new knowledge about popular culture and its links to cars, sport and music.

The transformation of the students was also evident in the outcomes they achieved on the 'Learning by Design Criteria for Measuring Learning' (Kalantzis & Cope et al, 2005, pp. 95-97). This framework evaluates performance on each of the Learning by Design knowledge processes at three levels: assisted competence, autonomous competence and collaborative competence. All four students were assessed at the beginning and end of the implementation of the Learning Element. Both teachers felt that Student F2 and Student M2 were mainly at the assisted-competence level at the beginning of the project. By the end of the Learning Element, they had moved to either autonomous competence or at least to higher levels of assisted competence. Student F1 and Student M1 were assessed mainly at the autonomous-competence level and moved to either

collaborative competence or higher levels of autonomous competence. This assessment, plus the evaluation of student work samples, indicates the transformation of all of the learners through the knowledge processes of Learning by Design.

The extent of learner transformation in this study could not have been captured through one-dimensional universal standardized testing which governments – both nationally and internationally – have used to respond to issues of diversity (US Department of Education, 2001; Australian Government Department of Education, Science and Training, 2006). Despite claims that it addresses diversity, such testing is one-dimensional and does not capture the learning that students are able to demonstrate through assessment linked to the teaching and learning which occurs in the classroom. Many studies emphasize the importance of addressing diversity through authentic assessment and the measurement of achievement against starting points rather than against state averages (Newmann, 1996; Strong et al, 2001; Comber & Kamler, 2004; Black, 2006; Hayes et al, 2006).

The negative effects of examinations on many students demonstrate how such testing works against diversity. Ryan & La Guardia's (1999) research highlights the importance of students' lifeworlds in designing learning. They found that high-stakes testing constrains teachers' curriculum choices and teachers' ability to address diversity by limiting their opportunities to respond to students' interests. Deci et al (2001) also found that with external rewards, such as grades on an examination or report card, students perform more poorly, think of themselves as less competent, and feel more anxious than when they use feedback from teachers to monitor their learning. This is supported by the increased confidence of Students F2 and M2, who met the objectives designed by their teachers but generally performed poorly in system testing.

Summary of Findings

Lifeworlds and Student Engagement

Through Learning by Design, the teachers made pedagogical choices that engaged students in their learning by drawing on and valuing their prior knowledge and linking classroom learning to the students' lifeworlds and learner subjectivities. There were multiple and varied starting points and multiple forms of engagement for the learners. Learning by Design also enabled the teachers to create a sense of belonging for their students, which, in turn, led to more engagement and intrinsic motivation, and supported new learning (Education Queensland, 2001; Australian Government Department of Education, Science and Training & University of Queensland, 2003; Kalantzis & Cope et al, 2005; Hayes et al, 2006; Kalantzis, 2006).

Scaffolded Learning

Learning by Design scaffolded student learning to achieve equivalent outcomes. The teachers provided support by going back and forth between the Learning by Design knowledge processes, and the students continually drew on prior learning and their lifeworlds to support new learning. This personalized the learning for each student, even though the learning had been designed for the whole class (Suominen, 2009). Each of the knowledge processes built on each other, and the teachers structured and sequenced them purposefully to deepen student understanding and to increase student agency. Representing different ways of 'knowing', the knowledge processes of experiencing, conceptualizing, analyzing and applying catered for different learning styles. In doing so, each knowledge process was important to address diversity (Cope & Kalantzis, 2000; Kalantzis & Cope et al, 2005).

Intellectual Quality

Learning by Design ensured intellectual quality through students thinking, discussing, problem solving, synthesizing, theorizing, drawing conclusions and developing deep understanding of the subject matter. This addressed diversity in that the individual perspectives of the students were drawn out, using collaborative strategies to ensure active participation, and built upon throughout the teaching and learning process. The diversity of perspectives was harnessed by the teachers to

enrich the discussions and collaborations (Newmann, 1996; Strong et al, 2001; Kalantzis et al, 2003; Hayes et al, 2006).

Metalanguage

Through Learning by Design, the teachers provided a metalanguage for their students to participate in thinking, discussing and writing about what they were learning. Naming a concept was the first step in understanding and so was an important aspect of scaffolding learning (Bennett & Rollheiser, 2001). Having a metalanguage was a critical aspect for diversity. It enabled all of the students to access and participate in the learning (Wilhelm, 2001), supporting the students to engage in substantive conversations, an important component of intellectual quality (Education Queensland, 2001). It also gave the students increased agency and increased their sense of belonging to the learning (Ryan & Deci, 2000).

Agency

Learning by Design transferred agency from the teachers to the students. Successful attainment of the learning objectives increased the sense of agency by the students. In order to enact the knowledge processes, the teachers selected collaborative activities in which the students were engaged in thinking, discussing, theorizing and synthesizing, rather than experiencing 'top-down' didactic models of transmission. The diverse perspectives enriched the discussion, as did the opportunity to critique in the analyzing knowledge process; hence the diversity of the students became a productive classroom resource.

Critiquing also empowered the students with more agency. With their increasing agency, there was more engagement and intrinsic motivation, and the students were positioned as active learners able to choose different pathways and end points in achieving the planned objectives (Rogoff et al, 1996; Ryan & Deci, 2000; Wilhelm, 2001; Kalantzis et al, 2003; Comber & Kamler, 2005; Hargreaves, 2006; Kalantzis, 2006). Further, diversity was also addressed through the students working collaboratively; in doing so, they became more tolerant of each other's experiences, backgrounds and learning styles.

Learner Transformation

Moving from the students' lifeworlds by taking them into new learning and expanding their knowledge, understandings and perspectives are essential to learner transformation. Through Learning by Design, the teachers tracked and ensured the transformation of the learners against the planned objectives of the Learning by Design Learning Element through different pathways and multimodal ways of demonstrating their learning (Kalantzis & Cope et al, 2005; Hayes et al, 2006). All of the students, despite their different starting points, achieved the outcomes of the Learning Element, which were closely aligned with system curriculum goals, including academic and social goals and involving learner transformation in skills, knowledge and sensibilities.

Teacher Practice

By using the pedagogical framework of Learning by Design, the teachers demonstrated that successful learners and learning goals require teachers who make purposeful pedagogical choices. The teachers, whether very experienced or a beginning teacher, used Learning by Design in a way that provided them with a structure for making these pedagogical decisions, but did so with flexibility in order to address the diversity of their students (Haren, 2005; Neville, 2008). The teachers also commented that they enjoyed planning collaboratively with Learning by Design and liked the support offered by their colleagues. Addressing diversity at the level of individual attributes would appear to be more time-consuming for teachers; however, they did not perceive the time required to plan and document negatively. Teacher A acknowledged that the investment in planning took the pressure off when she was really busy, while Teacher B did not refer to the issue.

Conclusion

Learning by Design is an effective pedagogical framework, working with, valuing and harnessing diversity. Rather than simplistic back-to-basics and one-size-fits-all approaches, Learning by Design emphasizes the important role of teachers' pedagogical choices to harness student diversity, scaffold learning, incorporate technology and diverse ways of meaning making, and address student underperformance. The Learning by Design approach also offers teachers the possibility of transforming their practice to meet the social justice goals of a truly inclusive education, as it provides teachers with innovative ways of creating belonging and student agency, addressing underperformance and ensuring learner transformation rather than assimilation.

Learning by Design can also take learners into new places and prepare them to participate in and contribute to a more just and diverse society and world. This is reflected in one of the student's comments about what he had learned about diversity in the Learning Element about popular culture:

> Popular culture ... I'm not entirely sure. It's just so vast. The way that even within cultures it is different. Like all over the world there are different groups. You've got people who like sport, people who like their music; you have people who work on computer stuff. You've got many different areas. Sort of, like, when you look at it like that, it's difficult to see how people are sort of prejudiced against different cultures ... when you might not know that they could be interested in the same popular culture thing, in the same category as you are. It's just the way the world is.

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