TOWARDS CONSTRUCTIVIST TEACHING AND LEARNING

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with grateful acknowledgment of the contributions of :

- David Bentley, Nancy Shaw, Peter Hodgman, and Deborah Pontifex (Direk Primary School) and Chris Quantrill, Gail Wood, and Carol Scerri (Pimpala Primary School);
- the University of South Australia Division of Education, Arts and Social Sciences for a research development grant which enabled the study to occur; and
- Margot Foster, Project Manager, Learning to Learn Project

A Report on Research Conducted in Conjunction with the Learning to Learn Project, November 2003

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Abstract

Recent developments in South Australia have emphasised the importance of constructivism as a theoretical basis for curriculum development and implementation, and associated school reform, in government schools. This paper reports on some initial insights from a qualitative study investigating ways in which teachers who are committed to a constructivist philosophy construct teaching and learning. The study is a collaborative project between the University of South Australia, The Open University and the South Australian Education Department. It is based around the work of four primary teachers in two schools in South Australia. These teachers have been involved in a South Australian Education Department innovative curriculum redesign project entitled 'Learning to Learn'. This project promotes a view of teaching and learning that values teaching and learning through: consciousness of who you are and why you do what you do, personal/social relationships and learning as construction. This paper will draw on examples to highlight a number of emerging themes in relation to the learning relationships, conversations and tasks that characterise classroom cultures that are moving towards a constructivist orientation.

Introduction

Recent developments in South Australia have emphasised the importance of constructivism as a theoretical basis for educational improvement in government schools. The new South Australian Curriculum Standards and Accountability (SACSA) Framework, which will govern curriculum development and implementation in government schools for the foreseeable future, presents the 'central thesis of constructivism' as:

> that the learner is active in the process of taking in information and building knowledge and understanding: in other words, of constructing their own learning. Learning is the active process of engaging in experience and its internalisation in terms of thinking. (DETE, 2001, p. 2).

Since 1999, departmental funding has supported teachers and project colleagues in the Learning to Learn Project to contribute to curriculum policy for the future by developing 'pedagogy which elicits generative thought and creativity as the needed 'knowledge' of the future' (Foster, Le Cornu, Peters & Shin, 2002, p. 3). The goal of the project is:

> The generation of new thinking and understanding about the learning process – knowledge generation [and] the translation of this knowledge and learning outwards to the system as a whole (Foster, Le Cornu & Peters, 2000, p. 5)

It draws on and promotes 'constructivism' as a theory appropriate to rethinking learning processes and towards achieving improved meta-learning. This guiding

theoretical position is seen to be relevant to the learning of teachers, students, administrators and policy makers (Goldspink, 2003).

Two of the authors of this paper have been university colleagues to the Learning to Learn project since its inception, while the third has been pursuing an interest in constructivist practices in classrooms in the UK. We decided to form a research team to investigate the perceptions and practices of four teachers who are involved in the Learning to Learn Project and who are currently attempting to implement practices with a constructivist orientation. Some early insights from this study form the basis of this paper.

Constructivism

Central to constructivism is the notion that learners play an active role in 'constructing' their own meaning. Knowledge is not seen as fixed and existing independently outside the learner. Rather, learning is a process of accommodation or adaptation based on new experiences or ideas (Jenlick & Kinnucan-Welsch, 1999, p. 4). Proponents of social constructivism also acknowledge the importance of the 'environment in which learning is taking place' and 'learning that requires social interaction ' (Richardson, 1999, p. 147). In framing this study and interpreting the data we have aligned ourselves with a social constructivist view. While recognising the importance of the construction of personal meaning within teaching and learning, we are particularly interested in the ways teachers and students work together to construct learning cultures that enable this to occur. By learning culture we mean the holistic collection of practices, behaviours, attitudes, patterns of decision making, relationships and valued systems of thought that construct a particular learning context (Windschiti, 2002, p. 150).

Constructivist approaches require learners to be active and confident in themselves and their abilities. It takes confidence for learners to admit that there are gaps in their knowledge, or understanding, and to take the risk of learning new ways of thinking. Learners may feel vulnerable about admitting their ignorance to others. This has clear implications for the way in which classrooms are organised and the quality of the *learning relationships* which need to exist if learning is to take place. Research suggests that students are more likely to become active participants in classroom learning activities when they feel confident of their abilities and the support of their peers (Collins, 1996). Furthermore, the nurturing of students' self-esteem is seen as one of the primary functions of any system of education (Indoe, Leo, James & Charlton, 1992; Bruner, 1996).

The teacher's skill in establishing *learning conversations* with and amongst students is also fundamental to the construction of knowledge (Bruner, 1996). Learning conversations allow students and teachers to identify prior learning and exploit the difference between what is already known and what might be constructed as new knowledge. However, the limitations of classroom communications and the strategies with which students might conceal their ignorance have long been recognised (Barnes, 1979; Cazden, 1988). Similarly, the importance of teachers moving away from 'teacher centred' conversations, 'to ways of interacting with individual learners in … relation to a real problem they are solving' is also well established (Groundwater-Smith, Brennan, McFadden & Mitchell, 2001, p. 213).

Finally, the idea that knowledge is not fixed and predetermined has serious implications for the ways in which *learning tasks* are constructed and carried out in the classroom. If students are responsible for constructing knowledge then it follows that teachers need to encourage and accept student autonomy and initiative. Learning tasks should be student-centered or provide opportunities for at least some degree of student choice. Learning should be 'participatory, proactive, communal, collaborative and given over to the construction of meanings rather than receiving them' (Bruner, 1996, p. 84). Consequently, teachers have to find:

> inventive ways of engaging students in meaningful practices, of providing access to resources that enhance their participation, of opening their horizons so they can put themselves on learning trajectories they can identify with, and of involving them in actions, discussions, and reflections that make a difference to the communities that they value. (Wenger, 1998 p.10)

As can be seen, particular kinds of learning relationships, conversations and tasks form the basis of classroom cultures that have a constructivist orientation. Accordingly, our focus questions for the study are:

- What are the characteristics of constructivist learning cultures?
- How are 'learning relationships' constructed in such classrooms?
- How are 'learning conversations' experienced in such classrooms?
- What kinds of 'learning tasks' are experienced in such classrooms?

The study

To explore the questions identified above we are using a qualitative research approach. According to Berg (2001), 'quality refers to the what, how, when, and where of a thing – its essence and ambience' (p. 3). Our aim is to achieve a rich and detailed representation of the 'what, how, when and where' of constructivist practices and learning cultures as they are experienced in four South Australian classrooms.

The study is located in two primary schools in Adelaide, involving two teachers in each school. Direk Primary School is in the northern suburbs of Adelaide while Pimpala Primary School is in the southern suburbs. Both are considered to be disadvantaged schools because of their high proportion of students who require government assistance. At Pimpala, Gail Wood and Chris Quantrill work with years 6/7 and R/1/2 respectively, while at Direk, Nancy Wilson and David Bentley team teach two classes of years 1/2.

Data collection procedures to date have included initial interviews with each teacher, weekly/fortnightly classroom observations (of 1 –2 hours duration) throughout the first term of the school year (in conjunction with an interview with the teacher/s concerned) and on-going document analysis. It is intended that these data collection strategies will continue to be used throughout the second term together with an individual interview with the school principal and small, focus group interviews with students who volunteer.

Merriam (1998) identified a collaborative or participatory approach to research as one way of enhancing the credibility and trustworthiness of naturalistic research data (p. 205). A collaborative approach to the research is occurring through involving the

teachers as much as possible, both in analysis and interpretations. Transcripts are returned to teachers regularly for annotation and further elaboration. Meetings are convened once a term to allow researchers and teachers to scrutinise the data and to compare and contrast emerging interpretations. The three university researchers engage in further validation of the data analysis by individually scrutinising the data in relation to the research focus and annotating the texts before passing them on to the next member of the team. Regular meetings are convened which facilitate the identification of themes in the data.

Emerging themes

Our analysis of the data to date has revealed a number of emerging themes in each of the key areas of learning relationships, learning conversations and learning tasks. These will be elaborated through examples and discussion in the remainder of the paper.

Learning relationships

Drawing on observation and interview data there is evidence that each teacher values and promotes relationships which:

- are respectful;
- promote student responsibility for learning; and
- contribute to the development of a learning community.

Respectful Relationships

All teachers in the study express the belief that the relationships they have with each student, and that the students have with each other, are integral to a classroom culture that optimises learning. Gail put it this way:

> I think relationships are really important. I really put a lot of time into talking through relationships and talking through the effects and consequences of behaviour. That is a real focus in my classroom. And I believe that if that isn't right then other learning doesn't happen….So I really do try to spend a lot of time setting up systems, protocol, codes of practice, expectations, all sorts of things to develop a classroom atmosphere where relationships are good relationships. (12/2/03)

In working with their students to develop learning relationships, their focus is on reciprocal respect:

> Respect for others and our environment is one of our school values…. The culture of the classroom is based on respect. (Chris, 12/2/03)

The focus on reciprocal respect is evident in the teachers' interactions with the students and in their expectations of students' interactions with teachers and other students. Teachers listen and respond to children in ways that aim to make them feel valued and that their ideas are taken seriously. They speak to students in a courteous and friendly manner, but use firm tones when necessary. Being conscious of what they say, how they say it and to whom, is an ongoing challenge for the teachers, as explained by Nancy:

> My manner is important. I would like to develop the way I listen to children. The way I speak…Keeping it calm. Using clapping to get their attention and not raising our voices. Little subtle things like that. And just trying to make sure that we get around to all the children and not the ones that are demanding our attention. That's hard." (Nancy, 11/2/03)

The teachers introduce the term respect to the students, early in the year, unpack it with them and then follow through to ensure that it is evident in the classroom. This includes naming behaviours that indicate respect as they occur so that children learn about the term. The teachers do not assume that the children share a common understanding of what it means but rather spend time, making it explicit.

When students behave in ways that appear disrespectful, the teachers intervene, by again, naming the behaviours and asking if the behaviours are respectful. They also focus on the effects of the behaviour on the other person(s) and involve students in making choices about more appropriate behaviour: "One of our classroom rules that we established this year was about making good choices in things we say and do' (Gail, 3/3/03). Once again, teachers work with the students to ensure that they are aware of the choices they make. For example, a child in Nancy and David's class had to explain his choice to his mother after school. When his mother asked why he had not finished his work, his reply was 'Because I made the wrong choice'. His mother, who also used the language of the classroom, said 'What choice did you make?' and the reply was, 'I decided to muck around' (observation, 11/2/03).

Teachers also work with the students to learn from the choices they make. Chris described her approach to conflict resolution as 'rather than having me decide who's to blame or who's not to blame, trying to get children to talk to each other about what happened and how it happened and what they could do next time' (12/2/03). In these ways, the students are encouraged to take responsibility for their behaviour and the kinds of relationships they establish with others in the classroom.

In all four classrooms, students are held accountable for the choices they make. Children learn that there are consequences for continuing disrespectful behaviour. So, in Nancy and David's class, for example, if they demonstrate such behaviour while they are in the 'learning zone', which is an area in the room where all children sit together on the carpet, the consequence is to be excluded from the learning zone. However, even when the student goes back to their table, they still have a choice: "You're at your table. You can choose to think about it and you are most welcome back or you can choose to practise this at lunchtime" (David, 12/3/03). If disrespectful behaviour continues, then other consequences are applied and as David explained, there comes a time when teacher choice may well take over from student choice:

> To the stage, where I think we start saying 'Now, we've got not choice. We are responsible for 50 other children in this room. Now we have no choice but to ask you to go to buddy class or over to the office, or meet with your parents…You need to think about the impact that you are having on the choices for the rest of the children in the room'. (David, 12/3/03)

Student responsibility for learning

The focus on students taking responsibility for their actions is also evident in the ways learning experiences are constructed in the classrooms. The teachers continue the building of relationships that are based around shared control of the learning process. The teachers show that they value students' ideas and encourage them to take an active role in making decisions about their learning. To what degree this occurs depends on many factors, not the least being the skills and age level of the students. For example, in Nancy and David's Year1/2 class, each day begins with a 'student managed curriculum' in which students choose, from a selection, which tasks they want to complete and in which order. Nancy and David acknowledge that while this is not really student initiated, it is developing the skills for decision making about learning. They explained:

> It's the idea, the concept, it's the growth from what they are doing here to potentially what the school is aiming for them to do. Which is by year 7, for them to make decisions about what am I going to learn, when am I going to learn it, how am I going to go about it and what's the end product when I'm finished. (12/3/03)

In Chris' Yr R/1/2 classroom, students are encouraged to share their interests and ideas with her and others. This can be in a minor way, such as the day when she directed the students to listen to a child who had drawn five boxes on the board with the labels 'mad', 'sad', 'great', 'happy' and 'lovely'. The child explained to the class that throughout the day they could put their names in the boxes if they were experiencing any of those feelings (13/3/03). On other occasions student' interests are drawn on to frame a learning activity for other interested students, such as when a child who was interested in gardening was encouraged to form an interested group of peers to plan and develop a garden for the adjoining courtyard as a mini project in activity time (26/2/03).

In Gail's Year 6/7 class, students are given the freedom to plan and organise what they want to learn, where this learning might take place, how they should present their learning as well as the criteria against which their learning should be judged (observation, 8/5/03).

Although wanting students to share control in what they learn, teachers are very aware that they need to balance student interests with system curriculum requirements, as can be seen in Gail's comment:

> I have had a look at the (SACSA) guidelines when I was doing some planning over the weekend. I use the term planning loosely because this unit is going to be very much self-directed. I can't really anticipate where any particular child might go. I read the relevant sections in SACSA just to familiarise myself with what's there so that I can guide each student if necessary. (17/3/03)

So, whether student initiated or developed within a framework of choice, the teachers aim to develop in their students, a sense of power over the learning process.

It is also about developing a particular attitude toward learning and the dispositions of being a learner:

> Kids take on a level of responsibility – just getting their heads around being organised and committing to time. And thinking, 'what do I need to do within that time to be successful?' (David & Nancy, 9/4/03)

And

> I like to encourage students to develop their own skills in research and presentation. I like to give them opportunities to manage their time well, increasingly better than what they have. So I work very much a big picture perspective. (Gail, 12/2)

However, increasing students' responsibility for their learning is not always easy, as indicated in the following:

> You can't make children do anything they don't want to…You give them choices and then make them realise that they are doing the choosing, but there is a consequence for their choice. So you say to them, if they don't like the consequences of that choice, well you step back and say, But I didn't make that. You chose to do that… (Nancy, 11/2)

And:

> They know by now that I won't solve it for them, I'll help them to solve it but I won't do the work. There are a couple of people in here who are very reliant upon others to help. One boy finds it very hard to do anything - English, maths, science, whatever - without me sitting down beside him and doing it for him effectively. Somehow I've got to work on that so that he's got the confidence to have a go himself, take that risk and be brave. (Gail, 18/2/03)

'Being brave' and 'taking risks' are attributes that are encouraged in these classrooms. Teachers acknowledge that like them, students use talk to help them make sense of their learning and they appreciate the risk taking involved:

> It is risky to say what you want to say without at least rehearsing it with a good friend or within a small group. If you stand up and expect the kids to stand up and take a risk, that's huge. (Nancy and David,12/3)

Students are also encouraged to have their own opinion, and take responsibility for their views. For example, in one session in David and Nancy's classroom a human graph was used, where the children physically moved into a line according to the extent that they felt quality work was important. 44 elected for quality is very important and 3 elected for quality is not important at all. The three children were affirmed for making up their own minds and not voting with the rest (observation, 7/5/03).

<u>Developing a learning community</u>

In these classrooms the focus on respectful relationships and shared responsibility for learning form the basis for a more holistic focus on building a learning community of students and teacher/s working in interdependent learning relationships. Chris

referred to such relationships as ‘quality relationships’ and related them to two of the ‘essential learnings’ identified in the SACSA framework – interdependence and communication (26/2/03).

Within these relationships the students often take on teaching roles, while the teachers are up front about the fact that in many situations they are learning alongside their students. For example, in Gail’s classroom she regularly shares with her students her excitement and curiosity about particular learning tasks, as occurred when they were exploring a possible mathematical relationship between number of tiles and number of possible tessellations. Gail did not know in advance whether they would find a pattern or not, but showed a great deal of enthusiasm for the possibility (observation, 15/4/03). Nancy and David are explicit with their children about any learning that they do, as occurred when they reported back on a professional development session they had attended on The Arts. David had found it easy but Nancy had found it difficult. They shared this with the children and Nancy said how she made lots of mistakes. David came in with ‘Mrs … did it tough. She could have got her car keys and left but she didn’t.’ (observation, 12/3/03).

There is a blurring of boundaries between ‘teachers’ and ‘learners’ as the teachers strive to develop a ‘learning culture’, a place where learning is valued and everyone involved is also valued. Such an environment is rich in social support. It supports students to interact effectively with each other and supports new participation structures in the learning process. Students are encouraged to see themselves as part of a team and therefore having a part to play in others’ learning as well as their own. Learning is talked about openly and questions are asked about the learning process: ‘What do you need to help you learn? How can we help you learn? How can you help others learn? (observation, David & Nancy, 26/2/03).

Consideration is also given to students feeling a sense of ownership for the spaces in which learning occurs, as explained by Gail:

> Hospitality is one of my big things. We have a small stove in the classroom. An urn. The students are encouraged to bring something from home for lunch that they can heat up in the oven or cook on the spot, or bring your noodles and add water and stir, or whatever. And there are other examples where I try to be hospitable and encourage that. It’s part of the relationship stuff too. It’s important. In my classroom students can sit where they like, when they like. They can put themselves in the furtherest corner and be alone totally for the day if they want to. Or change their table half way through a lesson. If someone feels like they really need to be under the window today, well they can do that. So hospitality is a big focus. (12/2/03)

Students’ interdependence as learners is developed by an emphasis on collaborative or team learning. For most activities they are encouraged to work closely with one or more of their peers, and to pool their expertise and questions as they try to solve the problems they encounter as learners. Even when students have the option to work independently, they are encouraged to interact with those around them to support their learning. In most cases students can choose their learning partners, but teachers monitor their choices, and are prepared to intervene where the choices seem to be

impeding learning. For instance, on one occasion as students formed groups to work on brainstorming known facts and questions about the topic of "Space", Gail vetted each group as it formed. She explained:

> Because I was anxious for this lesson to go well. And I know that certain combinations don't work as well as others. And I just wanted to be aware of who was working with whom. As it turned out I said 'yes' to everyone. Nobody used their time badly. It was just an awareness of who was working with whom. (17/3/03)

On some occasions, teachers deliberately structure pairs or groups to provide support for students who might struggle with the task:

> I also selected them by ability, in that a more able child could work with somebody who may not have thought of so many words themselves. I didn't want the mismatch to be too great though so I thought about it. (Chris, 13/3/03)

And at other times, the teachers ask particular children to take on more of a leadership role and provide more active support for some students:

> For example, Alison, Chris and Kate this morning. I had little private talks with them about leadership and modelling to the other children and responsibility and attitudes and all that. Just when they were coming up. (David, 26/2/03)

Learning conversations

'Learning conversations' imply a particular sort of interaction between teacher and children and children themselves. Such conversations support students to get to know themselves as learners and to develop as learners. They allow for meaningful dialogue, opportunities to share perspectives, make connections and 'make sense' of the learning. Characteristics that appear to be common to the learning conversations in all four classrooms are:

- use of explicit language;
- a focus on metacognitive processes; and
- a focus on support and challenge.

Use of explicit language:

In these classrooms there is an emphasis on using, and helping students to use explicit language that supports their learning. Teachers name behaviours, virtues, processes, and so on and use these constantly with the children in order to develop a shared language for learning. For example, in David and Nancy's classroom terms such as 'decision-making' and 'negotiating' are introduced to the children and then used constantly in different situations. Children are encouraged to 'think about your decision-making' and are asked 'what decision making did you do?' (observation, 9/4/03). Explicit terms are used both in individual conversations but are also brought back to the whole group for modelling purposes. For example, the children in Nancy and David's class, had a small group task in which four children had to draw a body, where each was responsible for the head, the trunk, the arms and the legs. Some children could not agree on who would do what and so when they came back to the learning zone, David said: "I saw some encouraging, that's great. But I also saw some glaring between people. And two hands went up for the same thing. Do you

think a decision has been made in that group?" (observation, 9/4). Nancy gave another example:

> We use specific terminology and terms like piggyback, rephrase, clarify. We ask: Would somebody like to clarify that? Would you like to rephrase it and say it in your own words? And we talked about piggybacking and somebody piggybacked on another idea, and we said, 'You are piggybacking, that's great.' (Nancy, 11/2/03)

This process is not always easy, as Nancy, who has been teaching for over thirty years, explained:

> I have to work hard everyday to use the language, and not fall back to the old ways…You have to remember to phrase things around learning. (observation, 30/4/03)

There is also a strong focus in each classroom on introducing, and using in context, key terminology related to the topic being studied. This can be seen in Gail's description of work related to the unit on Space:

> We've had a look at, so far, 32 words which are a word bank - a science/maths word bank. The words represent concepts which by the end of our block of work I would hope that people could be familiar with…(Gail, 17/3/03)

On another occasion, when the students were making tessellations with square shapes, she used the term 'dominoes' to describe the shape with two blocks and 'triominoes' for shapes with three blocks. As the students explored larger numbers of blocks there was excited discussion and speculation about how to label seven blocks (they came up with 'heptominoes' , which Gail related to the heptatholon), eight squares (octominoes), nine squares (nominoes) and ten (decominoes). Although these terms are the result of playing with language, rather than correct labels, what was noticeable was the students' interest in, and enthusiasm for, developing terminology to more accurately describe their learning.

Chris introduced her Year R/1/2 students to the terminology used to describe the 'Essential Learnings' that underpinned her curriculum:

> In order to give children a vehicle for talking about their learning, (I) started to introduce the essential learnings to them. So I had pictures with symbols for the essential learnings. When I was planning activities I was going to do with them and when they were planning what they were going to do, and this is still what I do, we would talk about 'communication' for example. Mainly 'communication', 'thinking, interdependence' and 'working together' and that sort of thing. So giving children a language for talking about what they're actually learning (Chris, 12/2/03)

<u>Focus on metacognitive processes</u>

These teachers support the children to know themselves as learners. They come to know what thinking is, what learning is and the different processes involved in learning. For Nancy and David, this involves talking to the children about how the

brain works, identifying what kind of thinking is happening and teaching about emotional intelligences:

> Talking to the children so they get to value what the brain is, what you use it for…teaching about emotional intelligences and things like the rooms of the brain which can be directed back to behaviour and teaching thinking skills. (Nancy, 11/2/03)

And:

> We talk to the children about things like emotional hijacking, anger icebergs, the red room and so on and we use a variety of specific learning tools to assist, such as David Langford's Brainstorm, Affinity Diagram, 5 Whys, etc. (David, 11/2/03).

Gail and Chris also highlighted their focus on thinking and reflection:

> We do a lot of thinking. Our focus is to identify the sort of thinking that is happening at the moment. Sometimes we are thinking mathematically or scientifically, but we might also be thinking creatively, fluently, flexibly. I can't remember some of the words on our white board that kids had brainstormed earlier in the week where we talked about the caring thinking. Caring thinking is a Matthew Lipman thing but the kids themselves suggested that you can do caring thinking. They weren't to know that someone has written a book about it. So we actually spend a lot of time with the mental cognition of what we're doing. That's a big part of my methodology I suppose. Encouraging the brain cells to work. (Gail, 12/2/03)

And:

> I've talked really about giving children experiences…And giving them time to reflect on what they're doing and giving them the language to talk about what they're learning. And critical thinking about what it is they're doing and saying. Having conversations around that… (Chris, 12/2/03)

The aim of these learning conversations is to help students to talk about their learning. Hence 'rich dialogue' develops, as students are able to explain their thinking, elaborate on their responses and pursue further avenues for learning. David described it this way:

> We need to use open-ended, engaging and cogitare questioning techniques to coach students to elaborate on, or contradict initial responses and to reflect on how this learning came about. (document, 15/11/02)

The teachers' responding skills are also critical in supporting students to share their ideas and thoughts. Nancy and David give feedback on their good thinking, not the right answer, even when they are not sure what is meant, their responses are encouraging. For example, 'I'm not sure what you mean. Take a minute to think it through' (observation, 9/4/03). Even when they have received a correct answer to

their question they often continue to ask for further comments to ensure that children are not merely 'guessing what the teacher is thinking'.

Focus on support and challenge

As well as supporting the students to *know* themselves as learners, the teachers support and challenge them to *develop* as learners. They closely monitor students' performance on tasks and support them through individual or group discussion. When students are engaged in learning experiences, the teachers promote their sense of ownership and responsibility by taking on a facilitative/responsive role, rather than a directive one. As students work at tasks the teachers circulate talking to individuals and groups. In particular they pose probing questions, seek clarification and additional information and offer encouragement. For example, providing feedback on how students were engaging with the task: 'I love that cooperating' and using cues to help them manage time, 'You have three minutes left, so start making some decisions' (observation, David & Nancy, 26/3/03). Sometimes when children were not engaging with the task, the teachers found that they needed to be more directive. However, it was still getting the children to make the ultimate decisions and supporting the allocation of particular group roles. For example, where a child was not doing anything and the other three children in the group were, David directed a question to the Manager of the group "Kane is here without a job. You need to give Kane a job. What could he be doing while you are cutting that out?" (observation, 5/3/03).

Gail explained the processes involved for her role as the teacher:

> Asking provocative questions; referring students back to the task quite frequently so they don't lose sight of the focus of the constraints that they are working under; encouragement; support; sharing their success and commiserating with the failures but not really to provide any solutions; perhaps refocussing with a question or a comment but not solving the problem for them. (18/2/03)

Although the teachers place considerable emphasis on students taking responsibility for their own learning, this is not at the expense of explicit teaching as it is deemed appropriate. Explicit teaching in the form of explanation, demonstration and the use of models and scaffolds forms a part of the learning conversations that the teachers have with their students. In each classroom there are occasions when the students gather together for explicit teaching. In particular this occurs when learning tasks are first introduced. For instance, Gail gathered the students together to introduce a task of designing the floor plan for a house they would like to live in, as part of a unit of work on 'Architecture'. She asked them to recall the talk they had had from a visiting architect the week before about designing floor plans and used examples from the Sunday Mail to show them examples of floor plans. She explained that a floor plan is as if you had lifted off the room and were looking down from above. She also explained the term 'block', used to describe the process of 'blocking out" the different parts of the floor plan before you putting in the final details. She asked the students if they remembered what 'flow lines' were and a student responded that it meant the paths that can be travelled around the floor plan. She then set them the task of individually or in pairs designing a floor plan that included the all the features they would like in a house and to block out those aspects on their plans (observation, 3/3/03).

The teachers also use models and various forms of scaffolding to help students with learning tasks. One example of the use of models can be seen in Gail's use of the floor plans from the Sunday Mail. A number of children were seen referring to these as they designed their own floor plans. Later, she referred a child who was struggling with representing a three dimensional structure in only two dimensions to a '3D' model of a house constructed earlier by some students, helping her to visualise how each level would look on a floor plan. Gail provided further scaffolding to individuals and groups. For instance, she suggested that two boys who were 'stuck' make lists of the features they would include, and that another child try a quick sketch first. As some children showed her drafts of plans she asked them to "walk me through it", which enabled them to identify structural problems with their layout.

Both Gail and Chris use scaffolding devices to support children to ask higher level questions. In Chris' class, the students have the option of rolling a dice during Sharing Time to help them frame a question. The dice has a question beginning such as 'What', 'Where', Why' and 'When' on each of its sides (observation, 13/3/03). Gail's students used a 'question grid', which enabled 36 different question beginnings, when they were brainstorming questions they would like to explore as part of a unit of work on Space (observation, 17/3/03).

Another way that Nancy and David scaffold the learning process is by using what they call a 'learning zone':

> We use this zone as an area you choose to leave when you feel you have understood enough information to be able to undertake a task. Conversely, you can choose to stay in the zone for further clarification, rephrasing or scaffolding. Once you have left the zone you can choose to return at any time. (document, 15/11/02)

Learning tasks

As the four teachers in the study attempt to move their practice towards a constructivist orientation they develop learning tasks that:

- have meaning for their students;
- are open-ended; and
- build the skills for independent and collaborative learning.

<u>Meaningful tasks</u>

A number of examples have already been given of the ways that teachers use the students' interests as a basis for planning learning tasks. Students are involved in identifying the topics and questions they would like to address, as can be seen in the process described here:

> I want to develop projects with small groups of children…. I'm calling them focus groups at the moment. And I've got a focus group of six children who are interested in finding out about the sun. And that came out of some discussion we were having about 'slip, slop, slap'. And they had all these questions about the sun. Because that's another aspect that I try to develop, is children asking questions. So I sat with this group and said, 'What is it that we could do to learn about the sun?' And tried to put their ideas into four boxes. (Chris, 12/2/03)

Processes such as this one increase the likelihood that the learning experiences have more meaning for students than learning tasks that are designed by teachers alone.

As well as connecting to students' interests, many of the learning tasks in which the students engage derive meaning from the fact they are designed to have real-life purposes. For instance, Gail's students spent a number of weeks working in small groups to plan a variety of excursions that were viable for the class to undertake, while Chris' students used measuring skills to construct Easter baskets that were then used for Easter Eggs on the last school day before the holiday (observation, 17/4/03). David described how another teacher helped him understand how to make tasks more meaningful, when she had children collect their own data for graphs (e.g. coloured socks), instead of using textbook examples (11/2/03)

A further way that the teachers add personal meaning to tasks is by having students draw on their existing knowledge as a starting point. Examples of such beginnings include Gail's initiating activity for the unit on Space in which students worked in groups to brainstorm 'Facts already known' and 'Questions'. She circulated from group to group challenging students to explain how they knew their facts were accurate, and the discussions which arose led to many 'facts' being changed into questions. This process also provided valuable information for Gail about students' different levels of understanding and 'misunderstanding':

> I haven't had a real good look at the questions they have generated, but that task isn't completed. I think there are a lot of misunderstandings that students will need to unpack. Comments such as, 'Stars are suns'. Misunderstandings about the universe that a lot of them hold very dear, and it may in fact be quite difficult to persuade them to think otherwise. I would like to go towards analytical thinking as well. (17/3/03)

David and Nancy also start with what the children know:

> We need to make the curriculum relevant for children to make their own meaning. We always try, before we jump into anything, to find the prior knowledge. So we do things like 'think, pair, share'. And use the learning teams to write down everything they know about the topic. Then we do a brainstorm. So we just build the knowledge. Then we try and bring in the stuff that we want the kids to know. (David, 11/2/03)

<u>Open-ended tasks</u>

The tasks in these classrooms are largely open-ended enabling students to enter and exit at different points. The fact that many of the tasks are also collaborative enables students to give and receive support appropriate to their individual levels. Chris explained how a maths task about patterns was open-ended and collaborative in these ways:

> Although they are all doing the same task, which is make a pattern, they are all doing it at their level. So children choose their own equipment and they choose which pattern they make and they go as far as they are able. Then I facilitate

> what they're doing and I'm suggesting that they repeat it a few more times if they are able to (or try) odd numbers, that kind of facilitator role. And I do quite a lot of partner work and group work as well. So when we were making patterns they were making them with a partner, which was fantastic because I saw in particular one year two boy working with a reception boy. I thought, '(I) don't know how this is going to go', because the difference between them might be too great. But in fact what they did was absolutely fantastic. I was really happy with what the year two boy had done and I'm quite sure that reception boy went one step further in his ability as well, through having worked with that child. (12/2/03)

In order for teachers to engage with students in meaningful dialogue about their learning, they need to know their students very well and have a very strong knowledge of their learning progress. To do this, teachers needed to have opportunities to observe their students at work. Students working on open-ended tasks can provide these opportunities:

> I found the lesson intriguing. The observations I made were fascinating. I learned a lot about various people's understanding of space and three dimensions. I now have to think about where that leads us and how we can move people along from where they are currently, to a better understanding of using space. (Gail, 3/3/03)

<u>Building the skills for independent and collaborative learning</u>

The tasks that children undertake in these classrooms require them to have a high level of self-reliance, and to be able to work well with others. From the beginning of the school year the teachers support them to develop the skills needed to successfully engage in both independent and collaborative learning. Gail explained:

> I really value collaborative work and cooperation. So I will, almost, give the opportunity to work with at least one partner. But I do recognise that there are times when you might be brimming with ideas and actually want to work as an individual. So often I will give that as an option as well. And there are compromises. You can work with a partner, share ideas, but do your own piece of work ultimately as well. And a couple of the students, the groups who will end up doing that, because sometimes I actually ask people to have their own product at the end of it. Sometimes it's a group product but sometimes I will ask them to share ideas, but then make their own brochure. So they will actually do their own blurb, their own writing. It might be the same house they are describing but what each student writes will be quite different. (3/3/03)

All the teachers also emphasise that there is a need for explicit teaching of skills and routines required for self-managed learning. For example:

> We acknowledge that time needs to be spent on direct teaching or modelling of specific skills to be an independent learner. (David, 11/2/03)

The teachers spend considerable time on developing the skills that enable each student to participate in learning individually and with others. This involves an emphasis on

students developing the skills of speaking clearly, listening when others speak, asking questions and responding.

Discussion

It can be seen from the examples of teachers' words and actions in the previous section that, although there are some noticeable differences in their classrooms and approaches, each of these teachers is attempting to develop classroom cultures that enable students to develop the attitudes, understandings and processes to work independently and collaboratively, make choices about how and what they learn and derive meaning as they engage with tasks.

It is not possible within the confines of this research to make judgments about the impact of the classroom cultures studied on students' learning outcomes, but it has been notable in each of the classrooms that there appears to be high levels of student enthusiasm, engagement, collaboration and on-task behaviour and completion. These are attributes that are missing from many classrooms, and ones that have been found to have strong links to improving student performance (Newmann & Wehlage, 1995). They are certainly outcomes that encourage these teachers to continue to develop learning cultures that are more constructivist in orientation. That is not to say that this research intends to present what teachers are trying to achieve as unproblematic. Emerging from some aspects of their practice are a number of dilemmas that are worthy of collaborative exploration through the remainder of the study. These dilemmas are inherent in the kinds of relationships, conversations and tasks that are evolving in these classrooms, and fit within the framework of conceptual, pedagogical, cultural and political dilemmas identified by Windschitl (2002) in his analysis of the challenges facing teachers who attempt to implement constructivist instruction. In the remainder of the paper some of these dilemmas, and associated risks, will be discussed briefly.

Dilemma 1: How can an appropriate balance between knowledge construction and the development of learning processes be achieved?
One of the tenets of a constructivist approach is that of helping students to adapt and build on their existing knowledge constructs in order to develop new levels of conceptual understanding (Fung, 2000, p. 175). Windschitl (2002) highlights a number of pedagogical dilemmas related to the degree that knowledge construction should be prioritised. These include whether all activities should result in knowledge construction by learners, whether all teaching should be based on students' existing ideas rather than on knowledge-based learning objectives and the extent to which 'expert' knowledge should be introduced to students (p. 133). The valuing of learning processes and students' ideas can be seen in many of the examples given earlier in this paper, but it is not always clear as to how much importance is attached to achieving particular objectives in terms of knowledge construction. This is an important dilemma to explore further because heavy emphasis on developing learning processes may run the risk that knowledge construction is under-emphasised.

Dilemma 2: How can teachers keep track of what individuals are learning?
Monitoring each student's progress and needs is problematic for many teachers (McLaughlin and Zarrow, 2001), but for the teachers in the study, whose students

mostly work collaboratively on complex, multi-level, open-ended tasks, it is particularly challenging. They face a further pedagogical dilemma identified by Windschitl (2002) – that of developing the types of assessments that will capture the learning they are attempting to foster (p. 133). In response to recent calls for assessment that encompasses a broader view of students' learning than that embedded in national tests, Frost & Durrant (2002) propose a framework which includes the areas of attainment, disposition and metacognition. Such a framework would more effectively capture the learning that occurs in these classrooms, rather than one which focuses on attainment alone. As teachers struggle to find appropriate ways of assessing learning in constructivist classrooms, and to cope with the demands of such classrooms on their time and energy, there is a risk that some students may go unobserved for long periods of time leaving teachers unaware of what is needed to progress their learning.

Dilemma 3: How much choice should students be given?
In each of the classrooms studied students are encouraged to make responsible choices about their actions and their learning. One of the common criticisms of constructivist approaches is that they are 'overly permissive' and that 'constructivist teachers often abandon their curriculums to pursue the whims of their students' (Brooks & Brooks, 1999, p. 5). Windschitl (2002) points to cultural dilemmas that face teachers who are trying to give students more choice in their learning such as whether students can be trusted to accept responsibility for their own learning and how to accommodate students different worldviews while at the same time transforming classroom culture (p. 133). That the teachers in the study have varying levels of comfort with student choice can be seen in variations in the amount of choice they are prepared to accommodate and the limits they impose through establishing boundaries in which choices can be made. It seems that the teachers are conscious that unlimited choice may be risky for some students.

Dilemma 4: What support do teachers need to sustain the high level of energy and enthusiasm needed to develop classroom culture with a constructivist orientation?
Brooks and Brooks (1999) make the claim: 'Organizing a constructivist classroom is difficult work for the teacher' (p. 8). As observers in these classrooms we have become aware of the heavy demands that using constructivist oriented approaches places on the teachers. They spend almost every minute interacting with students and constantly analyse and adjust their words and actions to bring them closer to their beliefs about student responsibility and meaningful learning. Little (2001) described the process of new learning required by teachers committed to change, as 'an emotional, intellectual and professional roller coaster' (p. 32).

There appears to be a risk that teachers, such as those in this study, may not be able to sustain over the long term their energy and commitment to improving learning cultures for students. It is likely that a factor in the sustainability of their reform endeavours is the reaction of their students, parents, colleagues and school leaders. In his analysis of the political dilemmas that such teachers face, Windschitl (2002) includes that of whether the support of administrators and parents can be gained when teachers teach in a different or unfamiliar way (p. 133). Gaining such support is likely to be particularly difficult in the current climate of rapid economic and social change in which many parents, the media and other educational commentators are calling for

a return to the content-based curriculum and uniform approaches of the past Hargreaves (2000).

Conclusion

In conclusion, emerging themes from this study reveal that the teachers are using a range of strategies to develop learning relationships, conversations and tasks that are constructivist in nature. As a result they are developing classroom cultures which have high levels of engagement for both students and teachers. However, as highlighted in the last section, there are many dilemmas and risks that need to be explored further in relation to these practices, and these will form the basis of ongoing reflection and dialogue in the remainder of the study.

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