

“It was taught good and I learned a lot”: Intellectual practices and ESL learners in the middle years

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Pauline Gibbons

UNIVERSITY OF TECHNOLOGY, SYDNEY

This paper reports on some of the findings from research that investigated how the notion of ‘intellectual quality’ is played out in schools where there are large numbers of students who are learning through the medium of English as a second language (ESL). Starting with the premise that high challenge, high support classrooms benefit all learners, the paper discusses and illustrates the recurring intellectual practices identified in five linguistically and culturally diverse classrooms, where the teachers were involved in action research projects. The paper also discusses the collaborative process by which the research was undertaken, and the teacher learning that resulted. It concludes with a brief discussion of the implications for pedagogy, and suggests that the ‘apprenticeship’ approach that broadly describes the pedagogy adopted by the teachers has the potential to be particularly significant for ESL learners’ engagement and participation in curriculum and language learning.

Introduction

The words in the title of this paper came from a Year 7¹ English language learner who had just completed a unit on energy and forces, structured around student-designed experiments aimed to test the validity of a number of common myths. In this paper I will discuss the findings of a project in which she was a part. This project, recently completed, was undertaken collaboratively between the University of Technology, Sydney, and the Multicultural Programs Unit in NSW Department of Education and Training (also see the article by Hammond, this issue). The project, entitled *Challenging Pedagogies*, explored how students for whom English was a second (or in some cases a third or fourth) language (henceforth ESL students) were supported to be successful participants in programs that were characterised by intellectual challenge. One major challenge in this work was to theorise ‘what counts’ as intellectually challenging learning, and this paper aims to contribute to that discussion. Our aim however was not simply to develop an alternative framework for describing what constitutes intellectually challenging learning, but to explore

1 Year 5 and 6 in schools in New South Wales are the final two years of primary school. Year 7 is the first year of secondary school.

what this learning *looks like* in the enacted curriculum, in the day-to-day discourse and tasks of the classroom, focusing in particular on the participation of ESL students in this learning. Since ESL learners are learning in and through a new language, and (along with native English speakers) learning to control new registers and new kinds of literacy, we wished also to identify some of linguistic challenges that may be involved for these learners.

Why this research?

A major rationale for conducting the current research grew out of a previous project that explored the nature of scaffolding, and our belief that ESL learners can and do achieve in high challenge classrooms given appropriate teacher expectations and scaffolding of learning tasks (Hammond & Gibbons, 2005; Mariani, 1997). Much previous research has suggested the significance of high challenge classrooms for successful educational outcomes. Educators have long been aware that low expectations by teachers are a self-fulfilling prophecy: the less that is expected of students, the less they will achieve (see, for example, the seminal work by Rosenthal and Jacobsen 1968). Studies of streaming and tracking (Gamoran, Nystrand, Berends, & Le Pore, 1995; Mehan, 1992; Oakes, 1986) show that one of the main reasons why some students do not achieve high academic performance is that schools do not require them to perform work of high intellectual quality. (Some of the reasons for this are discussed by Johnston and Hayes, this issue). Conversely, high expectations by teachers correlate with higher achievements by students (Brophy & Good, 1986; Carrasquillo & London, 1993; Darling-Hammond & Schon, 1996).

More recently in the USA, UK and Australia there has been, in various forms, ongoing work in school reform (see, for example, Johnston & Hayes, this issue; Newmann & Wehlage, 1995; Walqui, 1999), all of which is underpinned by the recognition that for *all* students the content and quality of the curriculum must be of high quality and designed to develop higher-order thinking skills. Newmann and Associates (1996) have presented three significant findings in relation to raising levels of academic achievement: first, that students from all backgrounds are more engaged when classroom work is cognitively challenging than when it consists solely of conventional low-level work; second, that all students, regardless of social or ethnic background, achieve at higher levels when they participate in an intellectually challenging curriculum; and third, that equity gaps diminish as a result of engagement in such curricula. Similar arguments have been put forward by August and Hakuta (1997) and Walqui (1999). Referring to the dual impact of increasing school diversity in the US, and the calls for reform that have as their goal the attainment of higher standards for all students, Walqui writes: “Language-minority students must be provided with an equal opportunity to learn the same challenging content and high level skills that school reform movements advocate for all students” (Walqui, 1999, p. 58).

Broadly, an intellectually challenging curriculum may be described as one where students are afforded the opportunities to engage in higher order thinking, transform information, engage in inquiry-oriented activity, and construct their own understandings through participating in substantive conversations with others. (These ideas are more closely examined later.) However, the explicit development of curriculum distinguished by these kinds of activities has in reality rarely been a primary focus of program planning for ESL learners. Rather, many programs have traditionally been more defined by lower level drill-and-practice activities and a focus on basic grammatical forms excised from authentic contexts of language use. In this context, the *Challenging Pedagogies* project represents two perspectives on the notion of challenge: what constitutes an intellectually challenging curriculum for learners, and how this in turn challenges more traditional notions of ESL pedagogy as involving a simplified or reductionist curriculum.

In line with sociocultural approaches to teaching and learning that positions both teachers and students as being active in a collaborative learning process², we wished to focus on both learners and teachers, that is, on the learning tasks and activities in which the learners were engaged, as well as the nature of the scaffolding that the teachers provided. Thus we aimed first, to describe the nature of intellectual challenge and intellectual quality by defining some of the major practices embedded in the tasks and activities in which students were engaged; and second, to describe the ways that teachers supported ESL students to be successful participants in these activities. To reflect this dual focus on both students and teachers our research was therefore framed around two questions:

- What are students *being* and *doing* when they are engaged in intellectually challenging learning? That is, what are the recurring intellectual practices that can be observed in the enacted curriculum?
- How do teachers support ESL students to participate in these intellectually challenging learning contexts?

This paper focuses primarily on the first of these questions and presents what the participants in the research saw as some of the key practices of intellectually challenging learning as it was realised in the focus classrooms.

Defining intellectual practices: Collaboration between teachers and researchers

Describing the intellectual practices that realise intellectual quality is an elusive and challenging task since it is first necessary to define what is meant by intellectual quality (see also the papers by Hammond; and Johnston &

² For discussion of sociocultural approaches and of scaffolding, see, for example, Gibbons, 2006; 2002; Hammond & Gibbons, 2005; Kozulin, 1998; Mercer, 1994; Wells, 1999.

Hayes, this issue). As a starting point we turned to work that has aimed to describe what constitutes intellectual quality, and noted a number of common elements in this body of work. Newmann and others (Newmann & Associates, 1996) have identified three criteria that together constitute their definition for high-quality intellectual accomplishment: the construction of knowledge; disciplined inquiry; and the value of learning beyond school. Drawing on the work of Newmann, the Queensland School Reform Longitudinal Study (1997) includes four related indicators for intellectual quality: higher order thinking (referring to the manipulation of ideas in ways that transform knowledge); deep knowledge (referring to the crucial and critical ideas of a topic or discipline); deep understanding (referring to the development of a systematic, integrated or holistic understanding rather than recitation of fragmented pieces of information); and substantive conversations (interactions around the ideas of a substantive topic). In NSW, the Department of Education and Training (DET) includes intellectual quality as one of the dimensions of *Quality Teaching*. Included as some of its elements are: deep understanding of substantive concepts; the active construction of knowledge by students; the use of higher order thinking; and substantive communication. In general all of these elements accord strongly with what we observed in our own research. However, because of our particular focus on the *enactment* of intellectual quality, we have chosen to identify intellectual quality in terms of the recurring intellectual *practices* that were evident in the classrooms.

The identification of these practices was the result of a collaborative process that involved the insights of DET teachers and consultants, and of the members of the research team, and of some of the students themselves. The process is described briefly here.

As Jenny Hammond describes in her paper (this issue), Stage 1 of the project attempted to map the field in terms of gathering data about how teachers currently thought about intellectual challenge, and in particular how they supported ESL learners to participate in such learning. Drawing on insights gained from this work, Stage 2 of the project moved into a more 'interventionist' stage, in the sense that it included a series of out-of-school professional development days with the university-based research team, where arising issues were collaboratively discussed and key ideas developed. These days included discussion of sociocultural theory and related pedagogical approaches (Gibbons, 2006; Kozulin, 1998; Mercer, 1994; Wells, 1999); 'apprenticeship' approaches to teaching and learning (Lave & Wenger, 1991); and socioculturally-driven theories of second language development (Lantolf, 2000; Swain 2000; van Lier, 2000, 1996).

Against this theoretical back-drop, a major part of the research was the development of in-school action research projects involving classroom teachers, subject teachers and ESL teachers. These projects took place in four secondary and one primary school over an eighteen-month period, during which

each school group identified their own focus area of interest, and then worked collaboratively with NSW DET consultants and the research team.

These school-based projects focused on the ways that intellectual quality is realised in the classroom, and how learners took up the related challenges. Projects were located in the curriculum areas of Science, Human Society and its Environment (HSIE), English, Music and Maths, and were planned and discussed during the professional development days. While focusing primarily on their students' learning, teachers also incorporated into their projects a range of aspects around programming and planning for intellectual quality: for example, the role of 'big questions,' Rich Tasks and backward mapping, and the value and role of substantive conversations in promoting intellectual quality. The resulting data included approximately eighty hours of classroom-based video footage, including interviews with teachers and students, about sixty of hours of which was transcribed; and field notes taken by individual members of the research team acting as classroom observers. In order to capture the actions and discourse of both teachers and students, two video cameras were used at each videoing session. The video footage and transcriptions were examined by the university-based researchers, with the teachers examining the data for their own school. The teachers also continued to offer ongoing feedback on the perspectives of the research team.

One significant outcome of this collaboration between teachers and researchers is that the teachers saw themselves as not only exploring issues around intellectual quality in their own classrooms, but, through the research process itself, becoming participants in their own intellectually challenging learning. They expressed the notion on many occasions that the collaborative nature of the research process, involving 'substantive conversations' between all research participants on a regular basis over an extended period, replicated the processes of learning that they were aiming to create in their own classrooms. As one teacher expressed it:

I had the space to have an idea, trial it, think about it, get feedback, trial it again ... unprecedented in my experience of inservice ... gave me a different look at my kids and my classroom... there are more open questions being asked... there is more open space in my lessons ... and higher expectations of what is possible.
(End of project evaluation, Dec 2006)

The degree of teacher learning is evident in a comparison of teachers' responses between the first and final professional development days. On the first day teachers were asked to complete the sentence *Intellectual challenge involves students in ...* Responses included: *asking questions; problem solving; reflection on learning; drawing conclusions; sustained talk; explaining; thinking critically and creatively; constructing knowledge; designing; experimenting; self assessment; transferring knowledge across KLAs; interpreting information; exploring relationships between ideas, concepts and texts.*

On the final professional development day teachers were asked to respond

to a similar question: *What does intellectual challenge require students to do/be?* While space does not permit a detailed discussion of their responses, a representative selection showing the range of responses has been included here to illustrate the greater depth in which they now thought about intellectual challenge, and the degree to which they had appropriated some of the key ideas and discourse developed through the project. What the comments also suggested was the importance that teachers now placed on students taking on adult-like roles in discipline-related tasks; on their appropriation of relevant and subject-related ways of thinking and using language; and on their understanding of the relationships between school learning and the world outside school:

behaving as 'legitimate participants'; requiring students to move from concrete to abstract and back; being stretched linguistically, socially and academically; learning of curriculum content along with language/literacy; learning how to learn; taking on adult-like roles; taking on different roles/ role reversal; students in roles as leaders, managers, facilitators, mentors; shifting roles from 'apprentice' to 'more expert'; developing field-specific vocabulary; linking concrete knowledge with scientific knowledge; making the familiar 'strange' by questioning everyday experiences; reflection on learning that creates opportunity for abstraction and for making links between 'big ideas'; clarifying knowledge for themselves in the process of telling others; transforming information to new contexts; students seeing connectedness of learning to the world outside school.

The following section describes the major recurring intellectual practices that teachers and researchers observed in the classrooms, and that are the result of the collaborative and reflexive process of engagement described above. Brief illustrations for each practice are included.

What are students being and doing when they are engaged in intellectually challenging learning: Some key intellectual practices

As Johnston and Hayes (this issue) point out, the success of teachers in implementing a curriculum characterized by intellectual quality depends in part on how the theoretical understandings of constructs such as 'higher order thinking' get translated and recontextualised into classroom practices. The practices described here are the result of this translation and recontextualisation, and so represent how teachers' theoretical understandings around intellectual challenge were enacted in the classrooms that we observed. However, it should be pointed out, that, unlike Part 1 of the research which attempted to describe the status quo of a range of classrooms, Part 2 was interventionist in nature and intent. Thus we do not claim that such practices are currently generalisable to other classrooms, or to classroom practice in general. We do suggest however that in the classrooms we observed, these were recurrent practices for students engaged in the kinds of tasks that the teachers saw as characterized by intel-

lectual quality and higher order thinking. We also suggest that such practices may offer insights for other teachers who may wish to reflect on the ‘scripts’ (see again Johnston and Hayes, this issue) they commonly use in their own classrooms.

Students engage with the key ideas and concepts of the discipline

What has been described in some frameworks as ‘deep knowledge’ of a field is qualitatively different from a knowledge of isolated ‘facts’. While we do not discount the importance of students being familiar with traditional ‘items’ of knowledge (indeed we would argue that traditional disciplinary knowledge is critical to thinking creatively and innovatively within the discipline), it is the use to which such knowledge is put that is significant in students developing an in-depth understanding and knowledge of the field. We noted that engagement with key discipline-related ideas and concepts often involved students in pursuing a coherent line of reasoning through activities that required them to ‘mirror’ the ways of thinking and meaning of scientists, historians or mathematicians.

Example: Year 7 History

Students were studying Ancient Egypt, and as part of their research took on the role of archaeologists in examining recreations of artefacts and tomb paintings on display, and explaining their significance in terms of what they *signified* about the way Egyptians lived. That is, the students needed to produce responses that went beyond literal understanding and reproduction of knowledge about artifacts and tomb paintings. Interestingly what we observed in this classroom is in sharp contrast to the account of the lesson on Ancient Egypt described by Johnston and Hayes (this issue).

Students transform what they have learned into a different form, for use in a new context or for a different audience

Transformation of information into a new context also appeared to be a key practice in all the classrooms we observed, and involved going beyond the simple reproduction of knowledge to the reconstructing of it in new contexts and often for other audiences. Information-transfer ‘exercises’ have long been general practice in ESL language classrooms, and usually require students to transfer information from one form (for example, a written text) into another (for example, a graph). In the classrooms we observed, however, the notion of transferring information was expanded so that the Rich Task itself required a transformation of information into a different mode, medium or artefact.

Example: Year 6 HSIE

Students presented to other classes what they had learned about Antarctica

in their Social Studies lessons, in the format of a popular morning TV current events show. This involved students in taking on the roles of presenters, directors, studio managers, script-writers and interviewers. Groups of students worked on different parts of the show, which included a commercial for tourism Australia, a weather report, a debate about environmental issues in the Antarctic by 'experts,' news and interviews. In the process of presenting the program, students needed to manipulate the information and ideas that they had previously developed, and combine facts and ideas in order to synthesise, generalise, explain, and interpret. As they transformed what they had learned about the disciplinary 'content' into a TV show format, the students needed to explore the differences between written and spoken language, and so make shifts in the mode and tenor of the discourse.

At the same school, students worked on a unit about their local community and carried out considerable research on issues such as mean house prices, recreational facilities, and local shopping outlets. Since the school had a number of migrant and refugee students, the students created an information booklet about the area for the parents of these children. This required considerable transformation of the information gained from the research of the area, including how to present the final substantial product as a very professional-looking booklet.

Example: Year 7 English and Music Integrated Unit, Intensive English Centre³

A group of students with their teacher co-wrote, produced and acted in a short scenario that represented a modern perspective on the Shakespearean play, *Taming of the Shrew*, thus transforming the themes of the play into a current and relevant context.

At the same school, students who were about to leave to go to local high schools worked on the theme of 'belonging' within the same unit of work. The music teacher developed with the students a response to the question: *Do you have to conform or compromise to belong?* Drawing on the students' own personal experiences of moving countries (often as refugees), such as the process of dealing with the associated personal and emotional loss and the need to learn to participate in a new culture and language, the teacher guided the students to express these personal experiences in more abstract ways, and, within the Music component of the program, introduced a song which she used as the basis of a discussion about the universality of such feelings. Students had opportunities to share ideas initially in language groups using their first language, before sharing these 'rehearsed' ideas in mixed groups through the medium of English. In their English lessons their teacher took up the same theme with the question: *How can a study of the Taming of the Shrew*

3 Intensive English Centres cater for secondary-aged students who are newly arrived from a non-English speaking country.

teach us about conformity and belonging? As part of this unit of work the students were asked to think about how they would complete sentences such as *When I left my country I left...*; *When I came to Australia I found...*; *When I came to this school I found...*; *As I leave this school I feel...* Through a joint construction with the students, the teacher recoded the students' everyday language (*friends, sad, happy, free*) into more abstract terms such as *friendship, sadness, joy, freedom and harmony*. These terms were used in a music concert that marked the end of most of the participating students' time at the school, in which many of the students performed. Transformation here worked at many levels: from personal experiences expressed in 'everyday' language to generalisable abstractions expressed as nominalisations; from the expression of ideas in students' first languages to their second language; and from shared classroom learning to the context of a performance with an audience.

Example: Year 7 History

The transformation of students' learning resulted in the production of a physical artefact. Based on considerable research about the shapes, patterns and colours of early Egyptian jewellery, students produced their own pieces of jewellery, and also made a museum card for each piece. As one student put it:

And it was actually really fun because we got to do all this stuff about jewellery and you got to make your own jewellery and that was, you know, you were learning a lot about Egyptian jewellery but you were also doing it ... and you got to make a museum card for it and ... to make the museum card you had to know about it. [Emphasis added.]

Students move between concrete knowledge and abstract theoretical knowledge

This refers to the ability of students to recognise the relationship between everyday knowledge and concepts, and discipline-related concepts and literacy, and is related to Vygotsky's (1987) notion of 'spontaneous' and 'scientific' (school) concepts. Such shifting between concrete and theoretical knowledge also required students to make field, tenor and mode shifts as they moved from 'every-day' to discipline-related language. Equally we noted that in some activities (such as the TV show described above) students were also required to do this in reverse, that is, to 'unpack' technical language into more everyday terms. It is perhaps this ability of students to understand and talk about the connections *between* concrete and theoretical knowledge that is one of the major characteristics of 'deep knowledge' of a subject, while the control of the associated register shifts characterise some of the most demanding linguistic challenges for ESL learners.

Example: Year 7 Science

In the following example, the students and teacher are reflecting on a "Myth Busters" video they had watched together. This came from a popular science

TV show, and this particular program focused on proving or disproving the hypothesis: *Wearing a tongue stud makes it more likely that you will be struck by lightning*. In this entertaining video scientists set up a series of experiments, using increasingly larger metal studs embedded in a number of constructed ‘heads,’ while keeping the charge of lightning constant. (Results were random and the scientists found no correlation between the stud and the likelihood of being struck with lightning, at least not until the size of the ‘stud’ was increased to about a quarter the size of the head!) In the course of watching the video students made notes on the scientific process that the scientists followed, developing their understanding of dependent, independent and controlled variables, which they later applied to their own experiments. The teacher was also concerned with developing the students’ understanding of the importance of replication in designing valid scientific experiments.

During teacher-student interactions, the students’ contributions to the discourse, worded in ‘every-day’ ways, were clarified and extended by the teacher through the modelling of register-appropriate (subject-specific) language. In the example below, note how the students have access to the term ‘replicate’ through the mode and field shifts: *kept doing it* → *many times* → *repeat* → *replicate*. (In the later part of the lesson, the teacher recontextualised this process as *replication* and this nominalisation was subsequently taken up by the students themselves as they began to design their own experiments.)

- S1: They have to do it [the experiment] **many times** so they can see if there are any changes.
- T: Yes so they can see if they get similar results.
- S2: And see if the myth is busted. It wasn’t getting busted but then they **kept doing** it until it got busted.
- T: So they did the experiment **many times**. Your experimental method should be **repeated a number of times** too ... so that a more accurate conclusion can be made. This is called **replicating** the experiment. ... OK so they **repeated** their experiments many times.
- S3: They **kept on** doing it.
- T: They **kept on** doing it. And this is what you have to do as well in your experiments. You have to replicate the experiment, you’re going to repeat it several times, replicate it. And why do we have to do that? So that we get...?
- S2: An accurate?
- S3: So that we get more accurate **results**.

Typically this kind of teacher-student discourse ‘meshes’ everyday and scientific ways of meaning, thus building on students’ prior knowledge as a

way of introducing them to new ways of meaning. This Janus-like talk was a feature of much of the discourse between students, and between teacher and student, and was generally a marker of students shifting between concrete knowledge and abstract theoretical knowledge.

Students engage with substantive conversation (through substantive conversation while learning, and public demonstration of what has been learned)

In the ways that we are interpreting substantive conversation, we would expect teacher-student and student-student interaction around the disciplinary ‘big ideas’ of the topic, and evidence in this talk of deep knowledge and understanding. Among the markers of substantive conversation we noted that learners initiated topics and raised questions, demonstrated a knowledge base through their use of subject-related language, and made their reasoning visible in their talk with peers. Substantive conversations occurred both between teacher and student in whole-class work, and between students in pair and group work. The collective, extended and cumulative nature of these substantive conversations is closely related to the kind of talk that Alexander (2005, 2006) refers to as ‘dialogic,’ a term he uses to distinguish this kind of classroom talk from the often non-purposeful, chat-like talk that is associated with informal conversation. Unlike dialogic talk, or substantive conversations, informal conversation does not explicitly promote a common language through which children can make sense together of their collective experiences.

Substantive conversations in whole-class teacher-student talk depended largely on the nature of the questions that the teacher asked, but also, importantly, on how contingently the teacher responded to what students said. Traditional classroom talk consists largely of a three-part exchange between teacher and student: the teacher asks a ‘display’ question (the purpose of which is to have students ‘display’ what they know); the student offers a response; and the teacher evaluates the response or gives feedback. By contrast, in order to create the contexts for more extended conversations, teachers changed the function and nature of the third evaluative move. For example, they invited students to give additional information, encouraged them to elaborate on their responses, or asked them to explain the reasoning behind their original response. This ‘redivision of labour’ (Wells, 1999), whereby students took on more of the responsibility for the meaning-making of the discourse, repositioned students as worthy conversational partners rather than mere displayers of received knowledge, and resulted in more extended responses from students. Even in a teacher to student whole-class context, then, there was more reciprocal substantive dialogue than is frequently the case in teacher-fronted contexts.

Within group work, substantive conversations were dependent largely on the nature of the collaborative group tasks in which students were involved: for example, the tasks involved students in taking on particular kinds of

roles, as problem solvers or as ‘experts’ whom others could later question. A frequent practice in all the classrooms was group discussion around what we have referred to as ‘Mediating Texts.’ These are texts that required small groups of students to ‘talk aloud’ their thinking and so make their reasoning visible in the discourse. (For related work, see Mercer, 2000, and his discussion of the ‘zone of intermental thinking.’) Typically a mediating text was a sheet of questions, a problem to which a small group of students had to collaboratively find a solution, or a planning document for some future activity. Thus the mediating text enabled the achievement of an outcome beyond the use of the text itself. Normally only a single copy of the text was given out to the group, requiring the sharing of information and ideas rather than individual work (see the example below).

Example: Year 7 Science

As described above, groups of students were required to carry out scientific investigations to prove or disprove common myths, using an appropriate experimental design. The mediating text in this instance was in the form of what the teacher called a ‘Thinking Sheet’ and was aimed to remind students of the process they should be following. It included questions such as:

Do we agree with the myth? Why? Why not?
How might we test this (give three suggestions and choose one)?
What are the two variables?
What steps will we need to follow?

After the experiment had been carried out:

Do we need to make any changes to our experiment? Why?
What have we learned about designing experiments?
What question have we helped to answer?
What is the scientific fact that explains our results?

Using the ‘Thinking Sheet’ the students engaged in substantive disciplinary-related talk, in particular around key concepts such as *dependent*, *independent* and *controlled variables*. During student interviews, when students were asked what had helped them in their learning, several students referred to the Thinking Sheet and the group discussion that accompanied it.

Mediating texts such as this allowed students to ‘talk their way in’ to understanding complex concepts and created affordances for students to engage in substantive conversations. From a curriculum perspective, the use of the texts provided a ‘curriculum space’ for substantive conversations to occur. These planned contexts produced more ‘written-like’ spoken language, provided scaffolding for later written tasks, produced disciplinary language used for authentic purposes, and made explicit students’ thinking, reasoning and implicit assumptions.

Students make connections between the spoken and written language and the semiotic tools and artefacts of the discipline

Language is the primary system for making meaning in school, but in addition different subjects make use of diagrams, graphs, tables or other semiotic systems such as mathematical or chemical symbols. Students were expected to be able to ‘read’ the meanings of these, understand they are alternative ways of presenting information and of making meaning, and use them independently as ways of making disciplinary meanings. Students represented the results of experiments through diagrams or graphs, and mathematical learning through the equivalent mathematical symbols or graphs; they showed their understanding of the relationships between characters in a play through sociograms; and in one classroom, they studied the process of deciphering Egyptian hieroglyphics. In each case, and as illustrated in the example below, the alternative ways of making meaning were also accompanied at some point by students explaining and justifying their representations through language.

It is important to point out here that the production of meaning in more than one way is not only an intellectually challenging activity, but conversely, may also be a supportive one for ESL learners, since it offers access to equivalent meanings from more than one source. I have referred to this process previously as ‘message abundancy’ (Gibbons, 2006; Gibbons, 2003; and forthcoming) and suggested that such contexts provide for ESL learners increased comprehensibility of often complex language and abstract concepts, along with access to new and register-appropriate language, thus avoiding the ‘dilution’ of language associated with curriculum simplification.

Example: Year 5 Mathematics (Graphs)

Students explored a number of myths to decide on their validity, and developed their own strategies for testing ideas, such as *your arm span is the same as your height, taller people have bigger feet, drinking a litre of water makes you heavier, heavier objects fall faster*. They then represented their findings using a range of different types of graphs (bar, pie, line, sector and picture graphs) which they then presented to other students using PowerPoint presentations. They also had to plan what to say in giving and explaining their presentations. The comments below indicate some of their responses to questions asked at the end of the unit concerning what they had to think hardest about, what they learned, how they felt and what helped them. The children’s responses suggest that they found the learning challenging but enjoyable, and that they recognised their individual learning. The following is a representative selection of comments taken from transcripts of the student interviews:

I had to really think hard when we were told to do four graphs by ourself but I really enjoyed it.

I learned most when I was actually drawing the graphs because I then knew how to draw them.

I learned most when we were doing the PowerPoint because now I can do it at home.

Students are encouraged to problematise knowledge and question 'accepted wisdom'.

The problematisation of knowledge requires students to recognise that knowledge can be questioned. Such problematising was evident when students took a critical orientation to reading a text, identified bias, critiqued different views, pursued a novel line of inquiry, offered an alternative solution to a problem, or changed their own thinking as a result of new learning. Processes for self-assessment and reflection were built into many of the units of work we observed, since much of the work around rich tasks involved students in collaborative problem-solving and so in dealing with alternate views.

Example: Year 7 History

Students had been asked to decide whether or not a particular Chinese emperor had been a just and fair ruler. Although they had been given access to a lot of historical material, it was left to the students to decide how they should interpret these sources. The history teacher commented:

One of the ways in which I think about [intellectual challenge] is for students to be able to make their own meaning out of the material and to construct something new out of it instead of just copying ... transferring it into a new situation or using it to do something else. And also to consider other possibilities, to open up the way they think about things ... So it should provide them with some challenge without answers that they could tick off and say, yes, I got that right because that's not a lot of intellectual challenge in that ... getting students to really look at, for example, different interpretations of something and come up with a conclusion ... it's open to possibilities for the students to say, well, there are many ways of looking at this. With Year Seven we gave them a whole lot of material about a Chinese emperor, and then they had to test a hypothesis, was he a fair and just ruler? So instead of just learning that he did all these things, they had to use the material to deduce something ... I think the concept that there are really no right answers is the important one ... I try always to raise questions rather than answers. I spend a lot of time in class talking about what the questions are, what are different ways you could look at this sort of thing.

Students in the same classroom commented in interviews that they found this process difficult but enjoyed the challenge. Their comments suggest that they had understood that written history always reflects the biases, ideologies and assumptions of the writer.

- S1: *I actually decided he was good, but ... all the evidence against him was kind of biased.*
- S2: *But you can't really say because it's so long ago and like all stuff's been written about him*
- S3: *Cause it's one of the ... you know there isn't a real answer, you can't get it right or wrong, it's just how you do it...that's what's kind of scary about it.*

Example: Year 7 Science

Students examined the accepted wisdom of a number of common myths (such as the length of time it takes a heavy and light object to reach the ground when both are dropped at the same time and from the same position). They were encouraged through the discussion around the mediating text to reflect on the outcome of the experiment they had designed, and, based on their evaluations of their design, to modify or change their experiment if they decided it required improvement. Thus they were discouraged from seeking a single answer, and encouraged to appreciate alternate views and to change their opinions when relevant.

More structured self-assessment was also evident in this classroom in the area of writing, when students were given a process to use for self-editing a report on their designed experiment, written in the form of a procedural recount plus discussion of results. A genre-based approach to writing informed these editing sheets, which involved students in reflecting on aspects of their writing such as its organisational structure, the connectives and conjunctions for linking ideas, the key linguistic features of the genre such as tense and voice, as well as spelling and punctuation.

Conclusions and pedagogical implications

The practices described above do not of course exist in isolation from each other. Indeed several of the examples could be seen as representing more than one of the practices: the graphing activity described earlier, for example, could also be viewed as an example of learning being transformed. In many of the units of work it was possible to see almost every practice occurring at some stage of the unit. It is important, then, to see these practices not in isolation from each other, but as a cluster of practices and events that occurred within a particular pedagogical approach.

This approach can be broadly described as one of ‘apprenticeship.’ Like the different occupations into which apprentices are encultured, schools and disciplines also have their own cultures and languages into which learners need to be apprenticed and encultured. Reflecting aspects of real-world apprenticeships, students are apprenticed into the discourse and ways of thinking in the process of participating in contextualised tasks that are situated and relevant to a particular discipline. Sometimes described in the classroom context as ‘cognitive apprenticeship’ (see, for example, Collins, Brown, & Holum, 1991), it shares many of the characteristics of real-world apprenticeship learning⁴, but is particularly concerned with making thinking and the implicit processes of problem solving visible. This is of particular relevance to students who may be unfamiliar with the language, registers and cultures of learning in school.

In the classroom examples described in this paper, students constructed

⁴ For an in-depth discussion of the characteristics of adult apprenticeship learning in a range of cultures, see the work of Lave & Wenger, 1991.

curriculum knowledge in the process of engagement in real-world-like tasks, imitating the kinds of reasoning and strategies that ‘experts’ employ. In this process they were treated as apprentices in a disciplinary community, rather than as passive receivers of knowledge. I use the term *real-world-like* to acknowledge that in reality classroom tasks rarely impact directly on the world outside school (with some exceptions, such as the young New Zealanders who recently took a major drinks company to task over the constituents of a drink claimed to have high levels of Vitamin C). The tasks were, however, *real-world-like*, in that they mirrored – or imitated (Vygotsky, 1987) – authentic ways of thinking, being and talking in the world outside the classroom. Imitating, unlike copying or mimicking, does not involve simply reproducing the expert’s model, but involves a role reversal by the learner, who begins to act in ways that mirror the expert or adult: when the students designed an experiment they were imitating some of the processes that scientists use, not simply reproducing ‘as is’ an expert’s ready-made version. And to the students themselves, the tasks were certainly purposeful and worth doing, largely, we would hypothesise, because they were engaged in tasks over which they had some ownership and agency. As one Year 7 student explained it: *when you sit together and do your work together, it’s your own responsibility.*

In all the interviews we conducted, students *were* also very clear about the need to learn through being given opportunities to be active participants in tasks. For example, referring to a former teacher (who was not one of the project teachers) three Year 7 students explained what they did *not* find helpful for learning:

- S1: *but with X we get, you know a sheet, and it’s got all this stuff on it ... and then a couple of words along the way she’s whited out a word and then all that happens is that she reads it all out and as she reads it we fill it in. And that’s all that happens and it doesn’t help.*
- S2: *because like either way we don’t learn from that.*
- S3: *instead of if you actually do it by yourself.*
- S2: *and we’re not actually like thinking hard or like what should go in here and why.*

A Year 7 student in another school also spoke about the value of being active in the learning, referring to a recent science lesson: *I learned because like we make it ourselves ... like we don’t copy it from a book because we get to **do** it [said with emphasis] it ... instead of just copying it, and it’s more fun if you design it and think about it.*

At the same time, as in all apprenticeship learning, explicit guidance was provided by the teachers to support students in doing tasks which they were as yet unable to do independently. While it is beyond the extent of this paper to discuss in detail the kinds of teacher guidance we observed, I will comment on it briefly.

We noted the extensive use of message abundance by teachers which amplified, rather than simplified, the curriculum; the use of many kinds of guiding mediating texts to create affordances for students to talk aloud their reasoning in collaboration with others, and to prepare them for subsequent tasks; the sequences of talk between teacher and students which allowed for sustained contributions from students and modelling by teachers; and the explicit teaching of disciplinary-related language and literacy. What was also commented upon by both teachers and students was the importance of the affective dimension of the classroom, where students' ideas were taken seriously and relationships between students were valued:

The best help I had was from my team-mates. [Year 5]

I found it actually not difficult. I found it easy because we were doing it as a group and you get more support with your fellow classmates ... because I find it a bit difficult working by myself because you don't get that much help like you get with working as a group. [Year 7]

The approach taken by the teachers appeared to offer a particularly supportive environment for ESL learners. It provided contexts for authentic meaning-making in interactional contexts, and for collaborative problem solving and enquiry. It provided contexts for modelling and explicitly teaching the registers and genres relevant to the subject and thus for focusing on specific aspects of language in the context of whole texts. Students learned *about* language in the context of *using* language, thus avoiding a disjunction between the teaching of language and the teaching of 'content.' What was also particularly significant for ESL learners was that the teachers' pedagogical approach led to a focus on their students' *potential* achievement through scaffolded support, rather than on their current levels of achievement in English. This proleptic orientation towards learning (van Lier, 2000) reflects Vygotsky's notion of the zone of proximal development, whereby learning occurs in the zone between what a learner can do alone, and what they can do with the help of a more expert other (Vygotsky, 1987). In these high challenge, high support classrooms, students appeared to be treated not as the people they were but as the people they could become. In the words of a Year 7 student:

It made me confident of myself that I could do it ... at first I didn't like science. And now, as I got through it and the teachers as they helped me through in it ... I got confident of myself that I could learn it.

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