Sustainability, globalization, the rapid growth of knowledge and the need for internationally minded citizens require a rethinking of education. Concept-based inquiry learning has been offered for over a century as an alternative to traditional education centered on textbooks, invasive standardized testing and control external to the student. Yet the widespread change in teaching styles required to shift education to meet 21st century requirements has been sporadic at best. This book tells several stories. The first is a teacher’s journey to discover a different way of teaching and learning. The second is a summary of the theory used to explain and justify the change in pedagogy to the wider school community. The third are stories from student and teachers who practice inquiry learning. The result is a description of 6 essential elements for a successful inquiry learning environment. Although this research was conducted at a single school, it offers important insights for other schools who are considering change to a more constructivist, sustainable approach to education.

Marcia Behrenbruch has taught at all levels of schooling from the early years to year 12. She has lived and worked in Canada, the Netherlands, Australia, Vietnam and Singapore. Most of her 15 years in school administration focused on curriculum innovation and facilitating change. She completed her doctoral studies at Melbourne Graduate School of Education and is currently a global head of professional development for an international not-for-profit educational organization.
Dancing in the Light
TRANSGRESSIONS: CULTURAL STUDIES AND EDUCATION

Cultural studies provides an analytical toolbox for both making sense of educational practice and extending the insights of educational professionals into their labors. In this context Transgressions: Cultural Studies and Education provides a collection of books in the domain that specify this assertion. Crafted for an audience of teachers, teacher educators, scholars and students of cultural studies and others interested in cultural studies and pedagogy, the series documents both the possibilities of and the controversies surrounding the intersection of cultural studies and education. The editors and the authors of this series do not assume that the interaction of cultural studies and education devalues other types of knowledge and analytical forms. Rather the intersection of these knowledge disciplines offers a rejuvenating, optimistic, and positive perspective on education and educational institutions. Some might describe its contribution as democratic, emancipatory, and transformative. The editors and authors maintain that cultural studies helps free educators from sterile, monolithic analyses that have for too long undermined efforts to think of educational practices by providing other words, new languages, and fresh metaphors. Operating in an interdisciplinary cosmos, Transgressions: Cultural Studies and Education is dedicated to exploring the ways cultural studies enhances the study and practice of education. With this in mind the series focuses in a non-exclusive way on popular culture as well as other dimensions of cultural studies including social theory, social justice and positionalities, cultural dimensions of technological innovation, new media and media literacy, new forms of oppression emerging in an electronic hyperreality, and postcolonial global concerns. With these concerns in mind cultural studies scholars often argue that the realm of popular culture is the most powerful educational force in contemporary culture. Indeed, in the twenty-first century this pedagogical dynamic is sweeping through the entire world. Educators, they believe, must understand these emerging realities in order to gain an important voice in the pedagogical conversation.

Without an understanding of cultural pedagogy’s (education that takes place outside of formal schooling) role in the shaping of individual identity—youth identity in particular—the role educators play in the lives of their students will continue to fade. Why do so many of our students feel that life is incomprehensible and devoid of meaning? What does it mean, teachers wonder, when young people are unable to describe their moods, their affective affiliation to the society around them. Meanings provided young people by mainstream institutions often do little to help them deal with their affective complexity, their difficulty negotiating the rift between meaning and affect. School knowledge and educational expectations seem as anachronistic as a ditto machine, not that learning ways of rational thought and making sense of the world are unimportant.

But school knowledge and educational expectations often have little to offer students about making sense of the way they feel, the way their affective lives are shaped. In no way do we argue that analysis of the production of youth in an electronic mediated world demands some “touchy-feely” educational superficiality. What is needed in this context is a rigorous analysis of the interrelationship between pedagogy, popular culture, meaning making, and youth subjectivity. In an era marked by youth depression, violence, and suicide such insights become extremely important, even life saving. Pessimism about the future is the common sense of many contemporary youth with its concomitant feeling that no one can make a difference.

If affective production can be shaped to reflect these perspectives, then it can be reshaped to lay the groundwork for optimism, passionate commitment, and transformative educational and political activity. In these ways cultural studies adds a dimension to the work of education unfilled by any other sub-discipline. This is what Transgressions: Cultural Studies and Education seeks to produce—literature on these issues that makes a difference. It seeks to publish studies that help those who work with young people, those individuals involved in the disciplines that study children and youth, and young people themselves improve their lives in these bizarre times.
Dancing in the Light

*Essential Elements for an Inquiry Classroom*

Marcia Behrenbruch

*Melbourne Graduate School of Education, Australia*
# TABLE OF CONTENTS

Acknowledgement.................................................................................................................................vii

Foreword................................................................................................................................................ix

Introduction: Why Inquiry Learning? Why now? .................................................................xiii

1. Looking at Inquiry .................................................................................................................................1

2. Dancing Spirals ~ Sustainable Education ~ Curriculum Theory ...........................................15

3. Inquiry in Practice: Research from the Outside .................................................................25

4. What’s Essential? Students’ Perspectives on Inquiry ...........................................................55

5. What’s Essential? Teachers’ Perspectives on Inquiry ............................................................81

6. The Essentials ..................................................................................................................................111

7. Reflection ~ Action .............................................................................................................................133
ACKNOWLEDGEMENT

To the Cornish Community: Making a Difference
The timing of this book could not be better. I would argue that we have reached an impasse in our preparedness for transformative and progressive curriculum work. Curriculum reform is always highly contested – and this book written by an experienced international educator furthers the debate on curriculum decision making in the 21st century. The author of this book, Marcia Behrenbruch, a colleague whose practice and research I worked alongside for six years, has succeeded in breaking apart the older and well worn factory models of curriculum design and implementation through her key questions: Why inquiry learning? Why now?

Teachers’ working knowledge of how school subjects interface with cross-curriculum design are not well understood. Historically, subject-based and cross-disciplinary curriculum designs, have been seen as an either/or divide, resulting in tensions and conflict among teachers. The International Baccalaureate (IB) has created a much needed impetus for thoughtful curriculum change and the rethinking of our knowledge of both disciplinarity – (disciplinary knowledge) and cross-disciplinary approaches to curriculum design. The argument made in this book is that “teachers and students are best placed to describe and define any ‘essentials, that is in this case, the six essentials of inquiry learning proposed by Behrenbruch. This statement and the design of the proposed essentials will challenge many academic sensibilities. But what is written in the book is a testimony to why this statement needs to be problematised, researched and reflected upon. This book is not a ‘how to do inquiry’ book. There are no lesson plans or steps to follow.

John Dewy in the 1930s argued for a more cohesive conceptualisation of learning rather than discrete subjects, and during the 1970s there was a distinct shift from discipline-based curriculum to a thematic approach, largely in response to Jerome Bruner’s theorising of how aspects of curriculum can be successfully connected or integrated. By the mid 1980s teachers were refining their view of curriculum and concepts were used to make purposeful connections across school subjects. The International Baccalaureate community have furthered this understanding, mirroring what reconceptualist curriculum theorists have long argued, that disciplinary knowledge and its contestation are crucial to understanding curriculum and schooling. Hence the ways in which teachers design curriculum across our changing fields of knowledge become critical to curriculum understanding and improving student learning in the 21st century.

The school at the centre of book is located in Victoria, Australia. Nestled in an inspiring uniquely Australian landscape, the school environment and building have received numerous awards for being a sustainable school. In the book Marcia Behrenbruch sets out to explain how an Australian school committed to the philosophy of the International Baccalaureate, over time transformed their curriculum practices, and in particular, visibly changed the
secondary school curriculum and teachers’ pedagogy. Over the last decade, hundreds of visiting teachers have attended professional learning days and participated in dialogue and renewed their understanding and conceptions of inquiry and how this dispositional orientation to curriculum works within this unique setting.

It is well known that there is a noticeable lack of substantive research that explicitly identifies the impact of cross-curriculum design (sometimes referred to as cross-disciplinary or integrated curriculum) and inquiry processes on student learning and how this might differ from a discipline-based curriculum. The popular bumper sticker words ‘I teach students not subjects’ hint at the curriculum divide within the teaching community and point to the prevailing understandings and misconceptions related to issues of disciplinarity, cross-curriculum design and the enactment of inquiry in schools. Can inquiry learning improve teaching and learning? Does inquiry provide greater purchase on what knowledge is of most worth in the 21st century? Can the close up study of one school identify how other schools can formulate approaches to curriculum design during major curriculum reform?

The book offers a new contribution to curriculum inquiry and conveys a fine-grained analysis of both teachers’ and students’ knowledge of inquiry learning. Further, the book adds to our understanding of the conduct of research in schools as significant whole school change is being implemented. It is an example of a systematic curriculum inquiry that used innovative insider classroom research enhanced by the researcher’s digital still photography and imagery so that we able to be and feel close up to the process. We also learn the importance of listening carefully to the voices of both teachers and students.

Practically and ethically, agendas of curriculum critique and reconceptualisation place enormous demands on the participants. When we add a researcher who is also the leader of the change process there are additional complexities. Inquiry learning has at its heart disciplinary knowledge and key questions of knowledge such as ‘How do we know?’ and ‘How do we collaborate?’ The book also details how collaboration was enacted during the research process and the challenges experienced. But also it is affirmed that curriculum can change and a school can over time more confidently accommodate and address the complexities of our rapidly globalizing world.

There are many questions that hover over the success or not of any school or system that claims they have made a significant change to teacher knowledge and student learning. In this book we are close up to the work of one school community. The book reflects the work of a single researcher, who at the time was also a key figure in leading change. First hand, I know that this was a highly collaborative and ethical process. This book will inspire and remind us that there are educators and communities who do denounce the status quo, can foreground their key values and be mindful of how their practices are forming. When a deliberative community is created, curriculum change can shift the reality of the classroom experience for teachers and every student. Understanding critical and sustainable sensibilities are imperatives for our life
in the 21st century. This book will encourage others to consider inquiry as the
turn for renewing pedagogy and curriculum.

Julianne Moss
Deakin University
MARCIA BEHRENBRUCH

INTRODUCTION

Why Inquiry Learning? Why now?

In a world defined by ceaseless change, we are less in need of fixed principles than we are in need of flexible habits of inquiry and a taste for imaginative approaches to social intelligence that will increase our capacity to perceive the consequences of our actions.¹

The idea of researching inquiry learning and writing this book started after a group of teachers touring my school asked in rather exasperated fashion, “What is the most important element for inquiry learning to be successful?” and “Where do you start?” A group of year 8 students who overheard this comment asked me later, “What’s the problem? It’s like…. basic!”

‘Basic’ doesn’t mean ‘easy’. Definitions of inquiry from education literature included: It is how children learn naturally; it is active; it is experiential; it is something students do, not something done to them; it has many stages; it is an active mental process that demands active participation by the learner; it is a form of assessment that blurs the boundary between assessment and teaching. Trying to answer the ‘what’ of inquiry learning is perhaps not a fruitful path. We kind of ‘get it’. We accept that it is how we naturally learn. The more pressing questions are the ‘why’ and ‘how’. Why should we teach and learn this way? How does it really work in practice? How does inquiry learning meet the accountabilities of governments? These are the more significant questions explored through this book.

I spent 10 years as a teacher and administrator in a small school - 320 students from the 3 year olds in the Early Learning Center (ELC) to 16 year olds in Year 10. We offered the International Baccalaureate Primary Years Programme (PYP) with its inquiry learning focus for students from the ages of 3 to 12 (ELC to Year 6) and a staff developed inquiry program for the secondary school (Years 7 to 10). Most of us who taught here had come from large schools of 1000 to 1500 students. We came to believe that it was not just the small size that helped change our teaching and learning particularly in the secondary school. More important was our close proximity to early years teachers experienced in the Reggio Emilia approach and our day to day association with primary school teachers who had been exploring how ‘Reggio’ could look in their classes and its connections to the constructivist approach of the PYP. In a
small school with a shared primary and secondary staff room, we couldn’t avoid hearing their discussions.

The school had also attracted significant attention since winning a national ‘sustainable schools’ award. As a consequence, we hosted on-site professional development on sustainability and inquiry learning for teachers from all Australian states as well as New Zealand, Hong Kong, Malaysia, Singapore and Sri Lanka. It was the question from one of these groups of visitors, “What’s essential?” that led to this research.

I wondered what students would identify as essential in an inquiry classroom. I wondered if students could identify long term effects of inquiry on their learning. I wondered if teachers would identify the same set of essential elements as their students. I wondered if some of these essential elements were more difficult to implement in classrooms than others and if this could help direct the professional development of teachers.

There are books and journal articles in academia about inquiry cycles, the connections to constructivist learning theory, inquiry in practice and examples of students’ work produced in an inquiry learning environment. There is little information that actually connects theory to practice and there is little research into how students and teachers, particularly in secondary school, perceive and understand inquiry. My argument is that teachers and students are best placed to describe and define any ‘essentials’.

Why my interest in inquiry learning? Many authors on the future of education agree that information-based education structures do not completely meet the needs of a globalised society. Thinking that is measured by standardised testing is no longer sufficient. Daniel Pink, a journalist with interesting views on the future believes that ‘artistry, empathy, taking the long view, pursuing the transcendent will increasingly determine who soars and who stumbles.’

These sentiments echo the education model proposed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) stressing the importance of students learning to know, to do, to live together and to ‘be’; that is to make skilled judgments and take personal responsibility. UNESCO’s 1996 report argued for changes to schooling that included relevant, holistic curriculum, problem solving, using the potential of information technology, an emphasis on formative assessment and engaging students in constructing their own learning, all of which are supported through inquiry.

Major studies in the 1990s alerted educators to the decline in student engagement starting in the upper primary years and continuing to senior secondary school. Lack of engagement affects not only students’ learning progress and attrition rates, but many other aspects of young people’s lives. Researchers and educators responded by recommending strategies for these middle years such as student involvement in decisions about what was taught and assessed, learning that was relevant to personal and social concerns, active learning experiences, engagement in complex, higher order and critical thinking to develop deep learning within and between disciplines, and learning with
peers as well as independent learning. Inquiry learning addresses all of these components.

Education policy documents in Australia, some states in the USA (for example, Colorado), Canada, Singapore and the UK have moved to feature inquiry as a significant pedagogy in their curricula. The trend towards inquiry learning is also evident in the growing number of schools taking on the International Baccalaureate Programmes – the Primary Years Programme (PYP), Middle Years Programme (MYP), as well as the Diploma. Inquiry by all teachers in all areas of learning is embedded in IB standards and practices and ‘inquirer’ is one of the attributes of the learner profile central to those programmes; indeed, it is the first on the list.

Despite researchers and educators support for inquiry there are other groups that continue to call for a ‘back to basics’ education and increases in standardised testing, particularly in numeracy and literacy. These ‘basics’ do not include the arts and narrow the range of the humanities. This movement is not as benign and neutral as it would like parents and teachers to think. Since governments continue to fund science and mathematics over humanities and the arts, the ‘back to basics’ movement continues to encourage an education system for the powerful sections in society that are also predominately ‘numbers’ based – banking, technology, trade and commerce – the marketplace. Schooling is seen as supplying this marketplace, valuing technical knowledge over aesthetic knowledge. Back to basics keeps us in the factory model of education.4

The question is also, ‘whose basics?’ Who determines what is important to learn? Paulo Freire,5 the great Brazilian educator of the 1970s believed in educating people to identify problems rather than just solve those presented to them. Freire realised that education, like science and politics is not value free. He believed that this critical kind of education is built on continual dialogue between teachers, students and parents and that content learning without relevance is meaningless. Teachers who use inquiry in their classrooms know that sound literacy and numeracy skills are essential, but they also know that enjoyment of school and empowering young people through relevant and significant ideas can enhance these testable knowledge and skills.

‘Back to basics’ is no longer adequate for a complex, global society grappling with the meaning of global citizenship and international mindedness. Children require a broader and richer description of events, and sensitivity for the ideas and meanings of individuals. Inquiry teachers model this by accepting that students bring understandings and experiences with them and that new knowledge is created when these understandings intersect in an active and critical way. The ‘back to basics’ movement fails society by ignoring the silences in education, for example, the absence of women’s and indigenous’ voices in historical texts and too often, the absence of environmental considerations in science and economics. Inquiry constructs meaning, finds hidden meanings, and develops understanding.
My final reason for researching inquiry is the increasing data coming from neuroscience research. Investigations involving MRI, (magnetic resonance imaging) PET, (positron emission tomography) and other scanning devices have led to an explosion in understanding how brain structures change over time and in response to stimuli. Educators and scientists who have studied this information suggest that compatible classroom activities include students asking and answering their own questions, reflecting on their learning, using simulations, linking music and the arts to specific learning tasks, using visuals to challenge thinking, physical challenges, collaborative learning and an integrated curriculum; all characteristics of an inquiry based, constructivist classroom.

Even where teachers and administrators agree on the importance of inquiry, implementing it is not straightforward. I am interested in identifying those elements of inquiry learning that teachers may need assistance in developing. In my reading, I came across the idea of threshold concepts. These are ideas that lead to new ways of thinking. They may be initially troublesome, but once understood, transform practice and are unlikely to be forgotten. What are these threshold concepts for teaching and learning through inquiry, particularly in a middle school environment?

Why should teachers initiate this research? Should it be left solely to universities and institutes? An important agenda of teachers’ research is to extend the vision of what is possible and to encourage other teachers to try new ideas and adapt them to their own teaching situation. A written account, rather than just a friendly discussion or a presentation at a conference is powerful for teacher professional learning if it includes rich stories that provide windows into classrooms; if the researcher is honest about what was and was not achieved; if the insights encourage adaptation, not just replication and if the research encourages teachers to explore change at their own level of understanding and risk.7

Thousands of years ago, Plato described the lives of prisoners in a cave. They had spent years chained facing the stone walls in front them. Behind them, fires provided light and warmth but their understanding of the outside world came only from the silhouettes and the shadows of objects from the road beyond the fire. The word ‘phenomena’ refers to these shadows on the walls that partly hide and partly revealed reality. As an educator with over 20 years experience I would say that I have moved through several caves. I learned how to manage a classroom and ‘deliver’ a curriculum. When I understood that cave wall, I turned and found that some education and governmental policies and processes didn’t match the needs of a significant number of students. After looking at a new ‘differentiation’ wall for many years and finally understanding its bumps and crevices, I turned and found that the theory that explained these shadows was far more complex and emotive than I had imagined. Beyond these shadows were issues around the environment and sustainability and internationally minded education. I had to grope through a final, very convoluted cave wall on
the connection between practice and theory before finally feeling able to turn outside and talk about changing 21st century education.

Phenomenology is a rigorous qualitative research method that looks past shadows. It is a return to the Greek concept of searching for wisdom rather than exact measurements. Searching for wisdom is a complex and time consuming affair. I had to ensure that I recognized and understood my own shadows – my own history and perceptions of inquiry learning. Some philosophers describe this as ‘bracketing’, but I prefer the gentler, respectful description of ‘bridling’. Bridling requires researchers to describe their perceptions and beliefs so that readers can determine if biases or misunderstandings have adversely affected the analysis and conclusions.

That data that I collected consisted of formal semi-structured interviews with 68 students from years 8 and 10 and 5 of their teachers. This represented over 80% of the students in each of those years. The teachers were those that had the highest number of contact hours with those students. Gender balance was approximately equal for both groups of students: overall 36 girls and 32 boys were interviewed. Three of the teachers were female and two male. I was interested in year 8 and year 10 students because these marked milestones in the school. Year 8 was considered the end of the ‘middle years’. Through year 7 and 8, these students had worked closely with a small team of teachers in a highly integrated program culminating in an exhibition at the end of year 8. Half of this particular group of students had also been the first cohort of our primary students to compete a year 6 exhibition as part of the International Baccalaureate Primary Years Programme (PYP). Years 9 and 10 were organised with a more explicit discipline focus to prepare students for the subject choices they would be required to make for their final two years of secondary schooling. Half of this group had also been students in the PYP. The focus for years 9 and 10 was still on students as inquirers, using sustainability as an overarching concept and culminating with an extended essay and a presentation based on ‘Drivers of Change in the 21st Century’.

The validity and reliability of this research is centred in my position as researcher within a community of practice. Communities of practice share common characteristics including a common cultural and historical heritage, and strong connections and interests that survive the departure of old members and readily assimilate the new. Communities of practice are reflective. As a teaching team, we shared classroom experiences, planning and assessment, taught together particularly when trying new ideas, and evaluated our professional performance. Our team meetings started with a review of current problems and issues. Future directions were suggested and discussed. We walked into each other’s classroom to observe students and colleagues at work and welcomed team members as co-teachers.

This community of practice also extended to our students. They were very involved in classroom planning, organisation and assessment. A strong student leadership programme at the school involved them in many aspects of school
decision making. In interviewing students, this reduced my concern about power
differential, with students possibly only saying what they thought I wanted to
hear. They were used to working with us and offering their opinions.
Throughout these interviews, students digressed to discuss relationship
problems with peers, and concerns about their futures in the senior year and
beyond school. This out-of-category information in almost every interview
indicated that students were not feeling intimidated. Students chose the
interview place and time, and interviews were with self-selected groups of two
or three students. They were completely aware of the purpose of the research.
They had the opportunity to look at transcripts and make changes.

This is not a book on ‘how to do inquiry’. There are no lesson plans or steps
to follow. The first chapter describes my experience with inquiry classrooms. It
offers images of what inquiry looks like, feels like and sounds like so that the
elements essential for its success, uncovered through research, can be placed in
a context. The next two chapters review what ‘outside’ experts say about the
theory and practice of inquiry respectively. Inquiry teachers take confidence
from being able to articulate the research of theorists and philosophers to justify
their classroom practices particularly in conversation with administrators and
parents. Chapters 4 and 5 examine inquiry from the perspective of secondary
students and their teachers who are actively implementing it. This offers insight
into the tensions and resolutions they experienced. The final chapters reconcile
the theory with the descriptions of practice. Although this is a single site setting,
the findings could offer some inspiration to schools contemplating a similar
pathway.

The decision to interview middle and secondary teachers and students was
quite deliberate. The primary school had sound guidance and support through
the PYP documents, IB professional development and strong networks of like
minded schools. Most of what the secondary staff learned about inquiry came
from our primary colleagues through their critical observations and their
generosity in sharing practice. Primary school teacher undergraduate education
tends to establish a better theoretical basis of how children learn as compared to
secondary undergraduate education which can have a stronger discipline and
classroom management focus. I hope primary teachers read this and are
affirmed that many of their practices are also powerful for older students.
Hopefully some of the theoretical basis and descriptions of practice support
secondary teachers in changing classrooms to better meet the needs of
adolescents without compromising quality of education.

The title of this book, ‘Dancing in the Light’ was inspired by Steve Seidel
from Harvard University. At the point in my research when I wondered why I
had ever started and if I would ever finish, I attended a Project Zero workshop.
There, Seidel used choreography as a metaphor for a different relationship
between what to learn, who learns and who teaches. It resonated with everything
that I believe about teaching and learning through inquiry. This is a paraphrase
based on the notes that I scribbled during his presentation:
‘I think teachers are like choreographers. They look for interesting, provocative and important ideas to explore that excite and challenge the dancers. They plan the steps and organise the rehearsals. They recognise when a performance is finally ready – when the dancers understand the message and can communicate it fluently. But choreographers don’t exist without the dancers. Dancers bring unique talents, interests and ideas. They change and improvise the steps. They challenge the choreographers’ own understandings and skills. As they rehearse together the dance becomes different and richer than the choreographer imagined. But in the end, at that culminating performance, the choreographer stands behind the curtain in darkness, watching the dancing in the light.’

NOTES

For 15 years, I was a conservative, subject oriented, exam focussed secondary school teacher. Text books and test banks were great. Parents liked me for discipline, organisation and good exam results. Administrators liked me because marks were always recorded on time and students fit the standardised curve with perhaps a slight skew to the right. Lessons were planned carefully and I tried to make them interesting, but whether students liked me or not was really irrelevant as long as they behaved and ‘learnt’; that is passed the exams well! I was a ‘modern’ teacher of science and mathematics and very seldom did the two meet unless experimental data needed to be plotted or analysed. Science would solve the problems of the world if we would just do what the scientists told us. There was a disquieting moment when my own children were young with the realisation that I knew little or nothing about how children learned to read and write. This was an interesting challenge and I returned to university to study this some more.

After some years, I found myself in South East Asia with my youngest child; the other children staying behind in boarding school. There was only an English speaking primary school in our area, so my son, who had just finished year 6, was destined for home schooling with his mother. I contacted the little international primary school just to let the principal know that if he needed an emergency teacher or a ‘volunteer mum’, I was available. Two days later, he phoned back. “We know of lots of high school kids being home schooled here. We can’t start a secondary school because we don’t have a mathematics or science teacher. But, if you are willing to come back to work, we could start one and then your boy could come too.”

Needless to say, my typical pre-teen son was overjoyed at the idea of not having to spend all day with his mother. The decision was made. However, there were a few details the principal hadn’t volunteered! When I arrived for my first day I walked into a class so far out of my comfort zone that I would have backed out immediately if not for my son’s enthusiasm. It consisted of 22 students from years 5 to 10 (10 to 16 years old). They represented 16 nationalities and over half spoke little English. We had no textbooks, no labs, no classrooms and I had no idea where to start.

We sat around a table; all of us, students, myself as the mathematics and science teacher, a part time Humanities teacher and an English as a Second Language (ESL) teacher. We were all in unfamiliar territory. The kids weren’t
convinced that we were real teachers (no books, no lesson plans yet) but we were all wise enough to realise that the parents and the principal expected us to look like a school quickly. I asked a fateful question for the first time, “What are we going to do?” A common point of interest in a very diverse classroom came unexpectedly quickly, “Bicycles!”

For the next few weeks we studied bicycles around the big idea that ‘bicycles can represent human creativity’. We explored the history of bicycles, their cost and importance in each child’s country of origin, experimented with the materials in bicycles, gear ratios, velocity and acceleration, sine and cosine values from turning wheels. Students wrote procedures about how to ride a bicycle and held practical lessons for those who never had. Finally someone said, “We know bicycles. What are we going to do now?” ... and the ideas just kept coming.

Until our text books arrived from overseas, every child brought in their books intended for home schooling. From English, Korean, Chinese and Thai mathematics books, we constructed a course that would meet this diverse range of age and background knowledge and skills. Although on one level I had always accepted mathematics as a ‘universal language’, this was the first time I had ever used number, equations and geometric drawings as the main source of communication.

For the first time I understood joyous learning, interacting with students and colleagues in a new way. Older students helped younger ones. Younger ones with better English interpreted for older ones who were just starting to learn it. My first personal lesson was on how much I had underestimated what children could learn. While working with a small group of year 10 students on an introduction to calculus, three year 5 and 6 students joined the group. ‘What are you doing here? Well, m’am, what you’re doing with them looks more interesting than what you left us to do!’ There was a relief in not having to be in control of every aspect of learning in the class. Negotiating, collaborating and cooperating replaced just offering choices. Classes were shared with teachers from other disciplines and ESL support teachers and we worked closely to build connections between our learning areas and our students’ interests. I didn’t have a name for this way of teaching. I had never heard of inquiry learning even in my undergraduate education courses.

After two years, I returned to conventional Australian schools and became just a science teacher again but it no longer felt right. I wasn’t allowed or expected to make rich connections between science, mathematics, history, literature and ethics. The barriers between disciplines seemed insurmountable and I could no longer hear the voice of students in the curriculum. I read, returned to university and changed workplaces to this school that has become the focus of my research and my stories.

Ten years later, as I came into my year 8 class, someone called out, “Hi, Mrs B. you’re late again.” We had a running joke about my timetable mix ups – not true this time. I was coming in to work with students on an inquiry they were developing around the impact of microbes on history, but my partner teacher...
from English and Humanities was not quite ready to move on and neither were
the students. Most were working on posters highlighting the important elements
of an ancient civilisation of their choice. Groups of two or three students were
working together with a laptop. They had pulled the round green tables into a
different arrangement so that they could all see the computer easier and have
more room to spread out the half dozen or so books they were also using. Other
students were placing iconic pictures of Ancient Egypt, Greece, Roman,
Mayans, and Aztecs along a time line that ran high up on the wall around the
room. Others were quietly reading while my partner teacher, Valerie, worked
with one student reviewing his piece of writing. The conversations continued as
we negotiated the changeover of teachers. “Let’s just finish this to a good point.
Keep working for a while if you want... Look at this Mrs B. I didn’t know that
these civilisations all happened so close together. Like you think they’re really
far apart until you put them on the line and then they sort of all sprung up. I
wonder why?”

Walking into the year 8 area still amazed me even after years of working in
this environment. Other than classes requiring the art, music, science or
technology areas, students stayed here and in the adjoining open area space.
Teachers came to them. The class sizes had varied over the years from 18 to 25
students in each class. The smaller sizes occurred during years when the
enrolments struggled with the economic realities of increased school fees or the
need to try and maintain a gender balance.

The entrance to the year 8 area was marked by a huge mural painted by a
group of students four years previously, based on the work of the Australian
artist, Charles Blackman. They decided that something had to go on that wall
and worked with the art teacher for several weeks looking at Blackman’s work,
painting small samples in his style before planning this large installation. We
were all proud of it. We’ve had numerous requests to sell it, but it would always
keep pride of place right where we could all see it. Even after four years it had
no marks, no damage even though it was hung in a busy corridor.

![Figure 1. Mural at entrance to year 8 area](image-url)
Coming around the corner to the classrooms there was another art project; large images that students had designed and painted to represent decades in the 20th century. Charlie Chaplin, Warhol’s canned soups, Rosa Parks and anti war posters captured the historical events that had caught their imagination. The walls were covered with students’ work, including their writing, photographs that students and teachers took regularly of their activities as well as posters and articles from current newspapers and magazines. The teachers’ planning documents were also there so that everyone could see what ‘might’ happen and what knowledge and skills we were aiming to develop in that particular term. Very few common textbooks were used, but fiction and non-fiction books were available in every classroom to encourage reading at any opportunity. Besides a wide range of library books, computer and internet access were important. Although this changed later, at the time of this research, the school was not a 1:1 computer school. Computers were shared on a 3:1 ratio.

Eight years previously, we had found ourselves with a very challenging group of year 7 students. They included a group of boys who soon developed a reputation as alienated and disengaged. They hated school, hated teachers, weren’t interested in science, history or geography, damaged school property and bullied each other. Unless something changed we would start to lose good students and girls – crucial to our gender balance policy.

As deputy head of the campus, I was very impressed that the staff response to the problem was not, “They need more discipline: Let’s put in a stronger detention system.” Staff agreed that giving detentions to students had never improved their relationship with them and clearly, we needed to improve relationships with these young people. We asked some hard questions. Why were these boys so unhappy? Were there underlying learning problems? Could we work more effectively with their parents? Were we meeting their needs? The last question was answered with a resounding “No”.

Figure 2. The year 8 area
At this point in time, our middle years’ team leader was also the atelierista – the artist – for the three and four year old children in the ELC. He kept insisting that I needed to spend more time with them. “The answer is there: they’ve got it right. They know what they’re doing.” In the ELC, I had an immediate sense of connection to my overseas ‘bicycle’ experience. The children were engaged in asking questions and exploring with the adults ways to find their own answers.

This was my first exposure to the Reggio Emilia approach to teaching and learning. First thing in the morning, the 3 and 4 year old children and their teachers met together to plan the day. Some wanted to explore ant trails around the veranda. Others made a giant spider out of Hessian and yarn. Another group was experimenting with combining paints to get the exact colour in a vase of irises. The children’s voices were as important in the decision making process as the educators. The rooms were beautiful – interesting objects to pick up, light tables and mirrors to play with and explore.

What immediately struck me in my conversations with the ELC teachers was that they saw each child as rich, powerful and situated in a community of learners connected to adults and other children. Every time they spoke about the ‘image of the child’ I could replace that with the ‘image of adolescent’. I could see that we needed to develop the same relationships with our older students.

As a staff, we read and attended professional learning about education in the middle years, considering not only what to teach, but how to restructure timetables and improve the school environment. We soon realised that this change would be quite challenging for teachers and parents, so we extended our learning to address change management and the establishment of professional learning communities. Teachers moved from a faculty structure to multidisciplinary teams working over two year levels, with all teachers responsible for pastoral care.

At this time, TV was inundated with crime shows and our students were huge fans so we decided to use ‘truth and evidence’ as our conceptual focus. Initially, we were thinking only in terms of our separate disciplines: What is truth and evidence in history, science, mathematics, art or literature? However, we soon realised that there was a more powerful way to use truth and evidence. Our students wanted to know about many issues that crossed our disciplines; current events that caught their attention, sex, how to solve conflicts and how to build relationships. They had a strong sense of justice and this led to a broader inquiry into ‘who we are’. Who are we as humans? Who are we as citizens from a local, national and global perspective? Teachers and students started to refer to the year 7 curriculum as TBQ – The Big Question. We worked together across our discipline boundaries, collecting evidence and deciding on ‘truths’ or often, that there was no single ‘truth’. Things improved. The boys settled down, we didn’t lose any more student and parents stopped complaining. By the end of the year we realised we had to be careful how we started year 8 the next year to avoid the problems surfacing again.
The research into middle schooling and inquiry advocated longer class times. The timetabling to meet constraints including keeping teachers’ employment allotments, shorter but more frequent time with additional languages teachers and regular physical education classes took hours of planning. The timetable was finally organised to allow for 80 minute classes rather than the previous 40 minute duration. As most teachers taught two disciplines to the same class, there were often ‘back to back’ classes – 160 minutes for a teacher to work with the same group of students. Because we were wasting less time in moving between classes, we found we could increase the time for home economics and materials technology and include more physical education.

However changing a timetable is more than just a scheduling issue. Teachers were worried. “What can we do for 80 minutes? Kids will never concentrate for that long. They can’t sit and listen for 80 minutes.” This rescheduling would require a huge change in classroom dynamics. Before agreeing to the longer class times we decided to try it for a week. After several months of planning, normal scheduling was suspended and the whole school worked in cross age groups of primary and secondary students in 100 minute blocks. This gave secondary teachers a chance to work with primary teachers who were quite used to longer class times and were able to model the range of classroom activities and differentiation techniques that they used on a regular basis.

At the end of the week several observations emerged. Secondary teachers were amazed how much they could accomplish in longer time periods. They felt that they accomplished more in a single 100 minute class than they normally would in three 40 minute classes periods spread over a week. Primary teachers became more comfortable working with older students and secondary teachers realised they could contribute to primary classes. New partnerships developed between primary and secondary colleagues and even after that week, they continued to explore ways they could work together.

The week opened classroom doors. Teachers became more comfortable with team teaching and found they actually enjoyed it. They started to identify its potential to decrease workloads through shared planning and assessing. The secondary staff agreed to implement the 80 minute timetable change for the following year.

During the last week of that difficult year, I was with a year 7 class, reviewing percentages, decimals and fractions in context of an inquiry into how we became human. One group calculated that there had been 900 lifetimes of Homo Sapiens of which 660 lifetimes had been spent in caves and only 3 directly experienced motors and electricity as daily commodities. This was an astounding calculation and led to a wonderful discussion about history and how change occurred. One student remarked, “Isn’t it a shame this is the last week of school and we can’t inquiry into this.” In one of my rare moments of insight, I responded, “Well, let’s start with that next year!” and 2WL was born. 2WL stands for ‘What Lifetime? What Learning?’ A team of teachers from the disciplines of Science, English, Mathematics, Humanities and the Arts started to plan how this could form the basis of an integrated curriculum. We developed
an essential understanding, ‘Learning from the past still connects to the present.’

Two additional questions emerged that would serve as a provocation throughout the year, ‘What change? What contributions?’ We wanted our students to realise that change was the norm throughout human history and that in turbulent times often ordinary people made extraordinary contributions. From discussions with students and reading their work, we realised that they were often pessimistic and fearful about everything from nuclear war and pandemics to environmental catastrophes. We wanted this year to convey a message of hope.

Not every teacher assigned to year 8 the following year was comfortable with the idea of integration to this degree. In the face of this uncertainty, we all agreed to remain open-minded and to evaluate the program together on a regular basis. The initial year 8 professional learning team consisted of four teachers; an English/Humanities teacher, a Mathematics/Science teacher (me), the Art teacher and the Technology teacher. Collectively, we developed a few ground rules. We agreed that the physical environment had to be interesting. We agreed that we would plan around the concepts of change and connection that were embedded in the essential understanding. A unifying point was a time line drawn around the four walls in each year 8 classroom that would serve as a visual documentation of change throughout history. As we discovered interesting things with our students, we would ask them to place iconic pictures or notes on the time line so that it would become a yearlong work in progress. We planned that most learning should be in groups, but that there would be options for students to work alone if they preferred. We developed some common assessment tasks and a culminating performance for the end of the year that would address standards from all of our disciplines. Classroom furnishings were re-considered to allow for this flexibility and differentiation. As old square student desks were due for replacement, round tables were bought that could be arranged and re-arranged in many different configurations depending on the group needs.
The daily organiser managed to arrange the timetable so that this team had a collaborative planning time of 40 minutes each week. Although this was never enough, we found that some teachers had time before and some after this ‘official’ time to continue discussions. In addition, most of us had desks in the same work area and soon found that even a few minutes recounting a recent event in the classroom was invaluable in our daily practice. We began to appreciate the power of narrative and stories. If an idea that the teaching team had planned was clearly not interesting to the students or was taking on a life of its own in a different direction we could quickly update our colleagues and partly prepare for it. The after school meeting schedules were also re-organised so that teaching teams could meet for 90 minutes at least two out of every four weeks. This strong emphasis on teams changed the focus of conversation in our staff room – it was almost always about students and teaching and learning.

The importance of documenting students’ learning processes in a variety of ways was another lesson we learned from the ELC. We looked at different types of evidence to use as formative and summative assessment and ways to involve students in the collection and analysis. This meant finding ways for students to reflect on their learning and make it visible to us. The idea of ‘reflection’ was a concept that we grappled with. How do you reflect? What are the different ways? Do different disciplines reflect differently? Initially we were limited in our approaches. One student remarked, “If I have to write one more reflection today, I’ll scream!”

We tried different IT approaches for collecting evidence. They were either too slow once students started uploading images or required too much room on the school’s server. In fairness, we had only a narrow broadband internet connection, so our attempts to use blogs, wikis and other application for reflection were frustrating. The simple and most inexpensive tool that we found for reflection were scrapbooks – the cheap A3 size books of blank pages available at every local newsagent and corner store. We encouraged students to put all of their formative work here from every teacher. The scrapbook would include drafts of essays, project outlines, interesting words, pictures from newspapers, ideas for discussion, ideas from television programmes watched at home, dot points from books read, mind maps, graphic organisers, comments on concepts that were confusing or curious ranging from algorithms in mathematics to provocative headlines. They were messy but served as a remarkable starting point for conversations. Over a year, students would fill up to 6 of these books. At the end of a school year, they served as an exciting record of what had been learned. This collection of formative material reflected their interests and understanding, serving as a valuable source for discussion and planning.
Looking at Injury

Figure 4. Students used scrapbooks as a formative assessment tool

Over the first year, we also realised the importance of design technology and art to provide reflection time in a different and often more effective format. The technology teacher addressed his skill requirements as students designed and built working icons of change over time - clocks and windmills. At one point, when many students were interested in medieval history, another technology teacher helped students make bread, yogurt and cheese and talked with them about how that technology – mostly invented by women - had changed during history. The art teacher encouraged students to bring their classroom interests to the art room as inspiration for whatever media skills they were currently developing. As a team we found that through art we could ‘see’ learning in a way that we often missed using the more conventional literacy and numeracy ‘languages’. For example, an art class developing techniques with pastels used their inquiries about the origins of the universe as their inspiration. As a science teacher viewing their gallery display, I could see the depictions of density, energy, strings, quarks, black holes, expansion, star formation, and solar gases; all interests that students had questioned and researched. We also realised that when students were developing their own questions and were actively involved in their own assessment, they were reflecting.
The importance of providing alternate ways of assessment and involving the students in the decisions of how they would make their learning visible was brought home most vividly through a year 8 student, Cassie. At one point during the year, a group of students wanted to know about terrorism. Why did people do this? For her summative assessment addressing art and humanities’ standards, Cassie chose to paint. In her canvas, she placed herself behind the pilots of the plane just as it would have hit the World Trade Center Tower on 9/11. The images and symbols she incorporated along with her written explanations expressed empathy and outrage and a sound understanding of the history and politics that the class had researched and discussed. Assessment and reflection were again, intimately connected.

As a teaching team, we learned to be flexible. A slogan originally attributed to John Dewey became our motto. ‘The job of the teacher is to turn impulse into purpose’. The planned and spontaneous, the perspectives of different disciplines
and using students’ interests as starting points were now characteristics of year 8. Formative assessment was as important as summative assessment. Big conceptual ideas and student questions determined the knowledge and skill development. Tasks were negotiated with students. As a team, teachers developed their understanding of how the local state curriculum could be addressed through inquiry. We mapped our emerging curriculum against these external standards and realised we were ‘covering’ not only the mandated knowledge and skills at that level, but also those from higher levels. More importantly, we heard our students asking complex questions that motivated them to learn.

The following year, teachers of year 9 faced an interesting challenge. They noted that the things they used to do weren’t working anymore. Textbooks were inadequate. Teachers commented, “These kids have their own questions. They’re not really interested in ours and their good questions are often not supported by textbooks.” So gradually, year 9 and 10 changed to accommodate the way students wanted to learn. Year 10 teachers decided that they really didn’t need separate History, Geography and Business courses. They could work together to explore issues that students felt were driving changes in their lives such as global warming, globalisation and politics. Science and English teachers at year 10 collaborated to explore genetic engineering, nuclear proliferation, the carbon cycle and how all of these big issues were reflected in the work of novelists, poets, playwrights and filmmakers.

As we were navigating these changes to the secondary school’s teaching and learning, the primary school was in the process of becoming authorised to deliver the International Baccalaureate Primary Years Programme (PYP). The elements of the PYP resonated completely with what we were doing; the transdisciplinary nature of the knowledge and skills, the concepts, the attitudes and the call for action as a consequence of inquiry. For various reasons, the school chose not to take on the International Baccalaureate Middle Years Programme (MYP) at the time, but we decided to parallel the language of the PYP and use their planning documents through to Year 10. Instead of the PYP transdisciplinary themes, we used dimensions of sustainability as a transdisciplinary focus. Essential understandings to be developed were mapped across personal sustainability, natural sustainability, socio-cultural sustainability and urban/technological sustainability. We found that we articulated disciplines more as students moved through the secondary school, but were still able to maintain the vision of basing teaching and learning on ideas of significance and relevance to our secondary school students.

This emphasis on sustainability and the environment provided another link to the ELC. We wanted continuity through the school of the concept of environment as a ‘third teacher’. We had worked extensively on the social and emotional ‘environment’, but this was also paralleled by an increasing awareness of the importance of the physical environment.

My favourite images of the school’s physical environment were winter ones – turning into the long driveway in the fog and seeing each tree lining the road.
come into focus through the mist. Over the last tree, school bags and uniforms on hangers were defined black against the soft white background. If we were lucky enough to have rain, the laughter of the early morning running group, the Mudlarks, filtered across the road as students, teachers and even a group of parents competed to see who could collect the most mud along the cross country running track. It had become a tradition to celebrate really wonderful rains with a true Australian ‘crawl’, a free style swim in the puddles. From the car park, I walked through groups of ibis and water hens on the grass areas bordering the wetlands. Towards the spring, there were flocks of pelicans floating on the lake and a migrant swan family with their little army of cygnets. Of the campus’ 45 hectares, 10 had been developed as a wetland. Twenty years previously the school excavated the lowest point of the property to form a lake and the community planted 25,000 trees to form an adjoining woodlands area. At the far end of the wetlands, there was a newly planted organic olive orchard. The students who planted it were inspired by the idea that olive trees could last thousands of years. Beyond the gardens was a small farm with sheep, cattle, a few alpacas, chickens and ducks. Yet, this was not a country school. It was located 35 kilometres from a major city, surrounded by dense housing estates and bordered on one side by a freeway.

The school buildings were cream and green modular structures. Despite the pre-fabricated origins, it seemed to have evolved in a rather random way. Four right turns didn’t seem to return you to your starting point. The individual buildings were connected by wide covered walkways with natural wood decks and perspex roofs designed to bring the outside environment to the door of every classroom. The inside environment offered another insight into the meaning of ‘environment as third teacher’. It was an art gallery of students’ work. Small spaces dotted along the covered decks became ceramic sculpture gardens where mermaids, octopi, tigers and space ships were interspersed with ferns and vines. The plain wire fencing was replaced in many places with wrought iron art work designed by students to match the themes of the enclosed sculptures. Wall murals depicted rainforests, aboriginal themes and Japanese gardens. Handmade fabric umbrellas swayed in high spaces. There was always something to see that provoked or pleased.

In addition to ‘school as nature’ and ‘school as art gallery’, other inside environments reflected ‘school as global community’. An indoor area in the centre of the school became a piazza. A red and black lacquered Japanese book case with costumed dolls and a changing selection of books in many languages were positioned close by. Another Japanese sideboard held a visitors book and journals with photos and written explanations of projects and activities. A Balinese wardrobe stored costumes from around the world for the younger students’ dress-ups and a low Indonesian table surrounded by cushions invited students to gather round for conversations or writing activities. Carpets from Afghanistan and Iraq were scatted over the floor and half a dozen tapestry seats from traditional Arabic tents supplemented the bean bags from the classrooms. Tall wooden Kenyan sculptures of giraffes and elephants intrigued everyone
LOOKING AT INJURY

who passed by. We wanted this room to contain beautiful things from countries that students often associated with war, terror or poverty. Overhead, students from the primary and secondary classes hung posters describing both local and global issues that were of interest and concern to them. The piazza was almost always full of students, even during class time. Students and teachers liked to work here. They spread out on the floor with math puzzles, held debates, and stretched out on the carpets to read or work on their laptops.

The school community - parents, students, teachers and school council - decided that new teaching areas should model sustainable building practices and support collaborative learning. They wanted learning spaces where students could see that it was possible to do simple things to the built environment that would make significant differences to greenhouse gas emissions. It took three years working with architects to design the first new building. It was passively heated and cooled through the interaction of solar chimneys, water walls and waffle flooring. A windmill and photovoltaic cells fed electricity into the state grid. This building was not computer controlled as we wanted students to have a ‘hands-on’ role. If it was too warm, they could close blinds, turn on the water wall and pull up the ceiling heat deflectors. The open area easily accommodated 100 students and their teachers. Tables were designed for easy storage and rearrangement into different configurations to suit learning activities. There was storage space for students’ work in progress and large display boards that rolled out from wall cupboards.

Older classrooms in the primary and secondary areas also underwent significant physical changes to support the changes in teaching and learning. Walls were removed in some places so that groups of students and teachers could work in larger spaces. Secondary classrooms, built over 15 years ago were proving too small. The classroom layout worked when students sat in desks and rows and didn’t move. However those spaces no longer provided an

Figure 7. Sustainable buildings

Older classrooms in the primary and secondary areas also underwent significant physical changes to support the changes in teaching and learning. Walls were removed in some places so that groups of students and teachers could work in larger spaces. Secondary classrooms, built over 15 years ago were proving too small. The classroom layout worked when students sat in desks and rows and didn’t move. However those spaces no longer provided an
environment to support the needs of inquiry learning with its inherent movement and flexibility of grouping. Corridors and areas between classrooms were enclosed and weather proofed so that students could spill out of confined spaces.

Bells were used only at the end of recess and lunch breaks to signal to students playing out on the grounds that it was time to return to classes. Our Early Years'Reggio colleagues reminded us that bells in between lessons send a message to students that their learning is subject to an administrative ‘control’ and is not really important. We moved smoothly to new classes with few audible reminders. A little lateness of teachers or students was tolerated with good humour.

The descriptions in this chapter are the shadows on my inquiry cave walls; my vision and understanding of what inquiry looks like, feels like and sounds like. The students and teachers are ones you will meet again in later chapters as they describe their insights into inquiry learning. What is the relationship between how we were teaching and learning here to curriculum theory and current research into teaching practice? The next two chapters look at some of those issues. The order parallels the problems that unfolded in the process of facilitating the school’s curriculum change so there are still stories to be told along the way.

NOTES

9 Charles Blackman, 1928- . Two significant themes in his work have been the ‘Schoolgirl’ and the ‘Alice in Wonderland’ series which inspired the work pictured here. Deep shadows and a sense of melancholy pervade his work. Blackman was awarded an OBE in 1977 in recognition of his status among contemporary Australian painters.
CHAPTER 2

Dancing Spirals – Sustainable Education – Curriculum Theory

I came back to Australia after teaching overseas looking for the opportunity to develop my understanding of inquiry learning. However, my new principal initially had other plans. He wanted a curriculum developed with the Earth Charter and sustainability as the basis of teaching and learning. I had to confess that in the years away from Australia, I had become somewhat disillusioned with environmental education. I recall sitting near a freight port in SE Asia watching containers of used plastic bags between dumped in the ocean. They had been imported from Australia, ostensibly for ‘disposal’. I had often failed to see changes towards environmentally sound practices even in schools that provided environmental education for all students. Rubbish still accumulated and paper recycling was inefficient. Responsible action seemed to missing. Before I could decide whether I should stay at this school my first questions had to be, “Is this school’s vision of sustainability the same as environmental education? Is the teaching and learning expected to be didactic or can the programme be developed through inquiry?”

From the first ‘walk through’ of the school it was apparent that it was very traditional. The secondary classes were arranged in desks and rows and teachers were at the front of the class. I would need to be able to justify my vision of inquiry in secondary schools as there would have to be changes. This would require understanding the theory behind what I had discovered so accidently in my overseas experience. I knew working together with teachers from a range of disciplines, first considering our students’ interests worked, but couldn’t explain why.

I always had a mental image of teaching and learning as ‘dancing’- hence my synergy with Seidel’s description of learning as dance and the title of this book. When I started teaching this image was ordered, like Degas’ ballerinas with the dance master in the middle. The more I became an inquiry teacher, the more the images morphed to resemble modern dance with its element of improvisation. As I started to look for a connection between inquiry, sustainability and curriculum theory, a colleague sent me a paper on Celtic spirals. They were found on amulets carved 24,000 years ago to represent a sacred dance, the journey of the sun. Some Bronze Age inquirer placed a stake in the ground and recorded the shadow it cast over a year. The resulting pair of spirals \( \heartsuit \heartsuit \) came to represent in many ancient cultures, water, power, independent movement or journeys. This has evolved to the modern mathematical symbol \( \sim \) which
joins values or ideas that can alternate or be interchangeable, hence my use of ~ in this chapter heading and throughout the book.

Spirals trace complex steps and connections. They symbolise the dance between two or more intricate ideas. In mystical and religious designs they often appear in groups of three symbolising land, sea and sky and the physical, mental and spiritual development of life.

The second and third spirals are always reactivated by, and reactivate, the first. Like three interconnected spirals, I needed to answer three connected questions: How can inquiry learning support sustainability? What are the theories behind inquiry learning? What is the research on inquiry in practice? This chapter looks at those first two questions and the next chapter at the third.

The term ‘sustainable development’ was coined by the 1987 United Nations World Commission on Environment and Development, more commonly known as the Brundtland Commission. Their report defined sustainability as meeting the needs of the present without compromising the ability of future generations to meet their own goals. The 1992 United Nations conference on environment and development (the Rio Earth Summit) addressed the role of education in bringing about sustainable development, referred to as Agenda 21.

Education is crucial for promoting sustainable development and improving the capacity of the people to address environmental and development issues. However, the catch words of ‘education for sustainable development’ (ESD) that have emerged since the Brundtland report and Agenda 21 have multiple and often contradictory interpretations. Some authors distinguished between ‘weak’ and ‘strong’ sustainability with the former associated with economic and the later with ecosystem sustainability. A group of British researchers described the components of sustainability as environment, society and economy. Others defined ESD as wholeness, posterity, smallness, community, quality and spiritual fulfilment. The New South Wales Government in Australia contributed to my confusion by defining ESD in terms of overarching and specific issues. Overarching issues included sustainable lifestyles, ecosystem health and bioregional awareness, infrastructure and institutional arrangements and local communities taking action. Specific issues were clean air, clean water and protecting the coast, to name a few from their substantial list. Not even the theorists or researchers seem to be able to reach a common definition. One positive aspect of this frustrating research into ESD was that I became more convinced that increasing the content of environmental education courses was not the answer.

Educators and politicians have long understood that education transforms individuals and societies. At no time in history has this responsibility been so significant. Many writers and researchers believed that ESD would be that force, but its progress has been slow since 1992 and Agenda 21. Critics of ESD point out that there cannot be a common view on what makes life worthwhile nor can governments dictate these values. Consequently, environmental education which
often challenges life style choices can be seen as interfering with the rights of citizens to make their own decisions. Environmental education may not have been effective as it could be, because it sought to change behaviours by imposing ideas rather than opening ideas for inquiry, intense discussion and consensus.\textsuperscript{12} This resonated with my concerns.

Deconstructivist curriculum theorists offer another perspective on EDS. They ask, ‘What’s missing? What’s not being said?’ For example, Gough analysed the concept of bioregionalism, a solution offered by some ESD thinkers to environmental problems. Bioregionalism proposes that landmasses be delineated into regions based on the location of watersheds. Nations would inhabit areas defined by these boundaries. However, ‘descriptions of the physical world are not prescriptions for social life.’\textsuperscript{13} The relationship between humans and nature is complex and cannot be pursued simply by looking at environmental studies as applied science in nature. ESD would perhaps be better served by a ‘rhizomic’ view of inquiring into complex and often hidden relationships.\textsuperscript{14} That ‘inquiring’ word again.

Transformative education requires critically reflective learning which encourages difficult questions, an understanding of different world views, and a search for creative solutions. Stephen Sterling, a prominent British environmental educator, argues that we should not use the term ‘education for sustainability’. He prefers the term ‘sustainable education’ which implies a shift to education that includes humanistic as well as ecological values and accommodates knew knowledge and different perspectives. It is the development of the kind of person who is an active global citizen. Sterling asserts that if more education is to save us, it must be education of a different kind.\textsuperscript{15} For me, that would have to be education grounded in inquiry with its inclusion of action.

Having now accepted the link between sustainability and inquiry, I moved to the next spiral in my personal dance. Changing classroom practice in the secondary school first required understanding the theories behind inquiry learning in order to convince administrators, parents and other teachers that it could work.

I started spending more time in the ELC listening and looking at the influence of the Reggio Emilia approach. Although the learning I observed in there looked like my understanding of inquiry, that word was seldom used by those teachers. Their phrases were ‘children constructing their learning’ or ‘children’s constructions’. What is the relationship between inquiry learning and constructivism? Is it applicable to learners of any age?

Loris Malaguzzi, the founder of the Reggio Emilia movement, was influenced by the work of the constructivists, Piaget and Vygotsky, and Dewey. Immediately following World War II, Malaguzzi became a teacher of young children working with a community in Reggio Emilia, Italy. The Reggio Emilia community did not want ‘ordinary’ schooling. The parents wanted a place where children could become critical and creative thinkers, skills necessary to rebuild and maintain a democratic society. This context was not unlike the current calls for creative and critical thinkers to work together to rebuild the health of the planet.
My own recollections of secondary school were of teachers at the front of the class. They asked direct questions, randomly choosing students to reply. I tried not to make eye contact especially when I wasn’t sure of the answer. I had a good memory so always did well on tests. The day after my last year 12 exam I could remember little of what I’d studied. Throughout teacher training I learnt techniques for breaking large topics into small bits that could be taught one at a time with clear learning objectives at each stage. All of my early education was influenced by this behaviourism or objectivism, so called because of its dependence on objective knowledge about the world that exists independently of the learner. Behaviourists believe in the existence of reliable knowledge about the world. As learners, the goal is to gain this knowledge; as educators, to transmit it.

This curriculum perspective is most often associated with Ralph Tyler and referred to as the technical production perspective. Despite almost immediate criticism, Tyler’s ideas still dominate schools as evidenced by the language of standards, benchmarks, outcomes and high stakes testing. However, ‘behaviourism’ existed long before Tyler. The word ‘curriculum’ itself was first found in print on a Ramist chart published in 1576. These charts developed by Peter Ramus (1515 – 1572) not only dictated exactly what needed to be learned but also the exact order it was to be taught. Ramus believed that knowledge transmitted in small steps in a specific sequence could control the thinking and behaviour of young men in his turbulent times. His charts are the template for our idea of textbooks. Ironically, Ramus was beheaded during the chaos and brutality of the St Bartholomew’s Day Massacre.

‘Curriculum’, as a Latin noun means either a racecourse or a chariot for racing. In the verb form, currere, it means ‘to run the course’. Ramus’ meaning of curriculum merged the noun and verb: The ‘what to teach’ and the ‘how to teach’ became ‘method’. This concept of linearity and structure in education reflected the science and mathematics of Ramus’ time when Galileo and his contemporaries were reducing nature to laws. Hence, ‘control’ has been implicitly imbedded in ‘curriculum’ since its inception. Ramist ideas particularly appealed to the Protestants and the Puritans and consequently ‘curriculum’ migrated to New England with long lasting consequences.

Control was also important in early 19th century American society exemplified by Frederick Taylor’s scientific management, Henry Ford’s assembly line, Binet’s IQ testing, and Thorndike’s conception of mind as machine. The huge increase in newspapers and journals reporting on these ideas fuelled the public demand for scientific management in schools. Students became raw materials which school transformed into a ‘finished product’.

In the early 1930s, there was a softening of the behaviourist approach coinciding with the Depression’s disillusionment with science and business. However the scientific and technology advances following World War I through to the Cold War again pushed the transmission models forward, this time supported by Tyler’s behavioural objectives. From 1965 to 1975, there was a brief flurry of informal classrooms and open education driven by societal changes in that era (Vietnam war, free love and the ‘hippies’) but this soon
returned to the ‘back to basics’ movement driven by business and commerce which is still dominant today. The implications from sustainable education suggest that there is a need for change away from this control driven model to one that promotes discussion, consensus and personal responsibility rather than a dependence on technology to solve global problems.

Despite behaviourism’s dominance there are other curriculum visions. Perhaps the most important for educators are the constructivist theories particularly those of Piaget, von Glasersfeld, Vygotsky and Dewey. Piaget, who is credited with first formalizing the theory of constructivism, believed that learners construct knowledge by assimilating experiences from their environment and accommodating them to internal mental structures or schema. Learning occurs in response to conflict, provocations or problems; when something in the environment does not match what we thought we understood. Piaget’s most influential research was on the importance of developmental stages. His critics believe this view of constructivism isolates the child, undervalues the role of adults and underestimates the relationship between cognitive, emotional and moral development. This may be unfair to Piaget as he did not specifically study the effect of teaching or other social interactions on development.

Von Glasersfeld’s radical constructivism built on Piaget’s work. Von Glasersfeld believed that nothing exists outside of the individual’s experience and new learning comes from disturbances between old experiences, the physical world and the social world. I struggled with the term ‘radical constructivism’ and the idea that each person sees the world distinctively. Radical constructivism always reminded me of one of Boswell’s stories about Samuel Johnson. After church one Sunday in 1763, they were discussing Bishop Berkeley’s sermon attempting to prove the non-existence of matter. In his irritation, Johnson kicked a rock with such a force that he rebounded from it and declared, ‘I refute it thus!’ Returning to von Glasersfeld and carefully reading his work clarified some misunderstandings. Constructivists who follow his philosophy are ‘radical’ because they take their theory of knowing seriously in contrast to people who used the term ‘constructivism’ fashionably, but with no intention of changing their practice from transmission to transformation – the trivial constructivists.

Radical constructivism suggests that there are multiple realities. How then do societies and cultures function? Vygotsky believed that learning could not be rigidly linked to developmental stages, although like Piaget he also identified several stages of childhood. The difference is that Vygotsky considered that developmental descriptions should reflect the whole child which includes his relationship to a social environment. Vygotsky focused on the significance of the relationship between adult and child. The aim of the adult is to bring the child’s understanding of her physical and social world forward through social interaction. Vygotsky described the zone of proximal development (ZPD) as that small place in time where an adult, whether parent or teacher can pull a student forward in her thinking using artifacts. The adult remains flexible, recognizing and accepting directions that a child’s activity may take. Vygotsky called this a zone of proximal development, not a zone of proximal learning.
The extension of his developmental philosophy to teaching and learning occurred long after his death with the 1978 translation of his work as *Mind and Society*.

Although Vygotsky focused on spoken and written language as the main artifact acting in the ZPD, he also included symbolic languages such as counting systems, mnemonics, algebra, art, writing, diagrams, maps and all sorts of conventional signs. In resonance with Vygotsky, Malaguzzi supported the importance of the ZPD in children’s learning and that learning requires a range of tools; the ‘hundred languages of children’ referred to by teachers using the Reggio Emilia approach. Those ELC teachers that I observed often used the phrase, ZPD. They looked for those transformative moments through discussion, art, movement and observation of play. They carefully documented those moments to plan future activities with the child.

Dewey, a contemporary of Tyler and Ford, developed a social-constructivist perspective for education. His philosophy was that the child needs to be the instigator of learning but that learning occurs in a social context as we are social beings. Dewey’s philosophy bridges the constructivist theories of von Glasersfeld and Vygotsky. Dewey believed that constructing knowledge starts with the impulse of the student which the teacher turns into purpose through meaningful activity. The impulse and the activities are shaped by the environment in which they occur which includes artifacts from the physical and social world - books, toys, materials for experiments, and other people – not just the teacher. Transformation of the learner is more important than transmission of knowledge and this occurs when meaningful activities are the source of learning. In addition to ‘transformation’ Dewey coined the term ‘transaction’ to describe a reciprocal relationship between an individual and the learning environment. The environment affects the individual, but the individual also acts on the environment. Through transaction, teacher and student are both transformed. They both become learners creating a common understanding. Dewey’s additional ‘principle of continuity’ means that every experience creates a new reality and opens up possibilities for further learning. This is the foundation of inquiry cycles, one question, one wonderment leads to another.

Dewey started with the interest of the child and the individual’s personal experience, not the structure of the discipline or the economic needs of an industrial society. Dewey embraced the scientific advances of his time but did not believe the industrial paradigm should be applied to education. Like his contemporary Vygotsky, Dewey believed in the power of science but also the need for citizens to act wisely in the new political and social institutions of the time. In parallel with Ramus, Dewey’s vision also reflected the new discoveries in mathematics and science. Quantum theory, uncertainty principles and chaos theory were replacing Galileo and Newton’s linearity in studying complex systems. The physicist and philosopher, Alfred North Whitehead was developing a new world view based on relationships rather than predictable atoms. Freud was expressing his disillusionment with the ability of knowledge separated from culture and understanding to answer the questions of ‘why war?’ This new
order was reflected in the Progressive Schools of the 1930s and 1940s – that ‘softening’ of the scientific transmission approach referred to earlier.

As with behaviourism, constructivism was also not a new idea: Socrates used it to guide his students. As all parents and teachers know, children have always constructed meanings about the world around them, sometimes incorrectly. Dewey acknowledged this problem of building incorrect knowledge by recognizing that there has to be a middle ground between ‘control’ and children as total instigators of their learning. Control is not situated outside the individual nor is it only self-control. Control is centered in communities of learners guiding activities to their natural end.

Critics of constructivism dispute its use in schools, because unlike behaviourism, there is no one set of rules that can guide educational practice. I like Perkins’ description of constructivism as a Swiss Army knife and accept that different situations may require a different constructivist approach. Piaget taught educators to be aware of developmental needs and differences in children. Von Glasersfeld’s view reminds teachers not to assume that all students have the same understandings or even that a teacher’s understandings can be shared by all. There is a need to differentiate for each individual. Vygotsky taught educators to use the relationship between teacher and student to look for ways to extend the child’s understanding through a range of ‘languages’. Dewey taught that all learning starts with the interests of the individual and that we learn through activity. Every activity must be meaningful leading naturally on to further exploration and everything in the student’s environment shapes learning.

Certainly there are specific issues around constructivism that I needed to think about carefully. A small number of researchers reported that students in constructivist classrooms lagged behind those in more traditional classrooms in basic skills. Some science educators warn that students in constructivist classrooms discover what is apparent to them not what is apparent to a professional scientist. In group work, the exclusion of minority groups’ voices may favour white, middle class and male priorities. Feminist writers have expressed the concern that constructivism focuses on cognitive knowing without considering how things might be known intuitively or instinctively: it may not consider how emotions are constructed or their role in learning.

In the mid-nineteen seventies William Pinar and Madeleine Grumet proposed that educators move beyond a good / bad division between behaviourism and constructivism and transform the whole idea of curriculum to meet new times and situations. Continuing this post-constructivist or re-conceptualist vision, William Doll and Noel Gough described curriculum through 5Cs - currere, complexity, cosmology, conversation and community. They returned to the verb ‘currere’ to re-focus the emphasis on how understandings are constructed, the ‘running of the course’ as a personal experience. There is no set starting point, ‘the beginning is in the existential moment and as the experience, with communal help, plunges into a situation, a matrix of connections (rich, recursive, relational, and rigorous) emerge.’ Complexity accepts chaos and acknowledges that nature is not simple: complexity can be a source of creativity.
Cosmology demands a universal view focusing on relationships and interdependence rather than brute facts. Conversation or dialogue brings together different perspectives, enhances relationships and develops understanding, not just knowledge. In resonance with Dewey and Vygotsky, experience is constructed socially in a community dedicated to care and critique. Good inquiry includes all of these 5Cs.

Cherryholmes, another reconceptualist, considers that all curriculum theories are ‘under erasure’- they change and blur. Curriculum as ‘what to teach’ can be accepted and rejected simultaneously. Good teachers have always accepted the content that is provided for children to learn while rejecting parts which they consider incomplete or authoritative. Similarly ‘currere’ can be simultaneously accepted or rejected. Good teachers have always known that the initial way students engage in learning can simultaneously be accepted by appealing to their interest and imagination and rejected or changed through offering different experiences and interpretations and encouraging critical thinking. This stance helps resolve some of those criticisms of constructivism mentioned previously. Misunderstandings in science can be a starting point to be investigated and rejected. Feminist and minority concerns can be countered through careful conversation and consideration.

Blurring the boundaries between curriculum and currere, the ‘what to teach’ and ‘how to teach’ with ‘who teaches’ is the final rejection of Ramus’ ghost of control. Inquiry learning, although grounded in constructivism, requires one step further. It is not just teachers who help students construct learning. Reconceptualist inquiry returns full circle to support Dewey’s transformation and transaction.

Both student and teacher are called to be artists in the construction of a better life and a better world. Inquiry is also transactional art. The relationship that develops between teacher and the student enables each to grow and change. The teacher sees creatively and imaginatively in the medium, the student, a mixture of the actual and the potential just as the student actualizes the teacher’s potential and limits.

This personal journey to understand the theory behind inquiry led me to sympathize with von Glasersfeld. Just asking students questions and having them find answers that are not relevant to them is ‘trivial inquiry.’ It does not allow students to construct their learning. ‘Radical inquiry’ starts with the interests of the student but takes constructivism to another level of complexity that involves the transformation of teacher and student, erasing the difference between them and reinforcing the importance of a community of learners. In the nature of spirals connecting to spirals, this is also crucial to sustainable education and any education that claims to develop internationally or globally minded people.

Dynamic, guided inquiry helps create thoughtful deliberative and wise people. I would suggest that the development and implementation of this form of inquiry in school environments also leads to a more tolerant
people whose understanding of diversity and the other’s point of view will engender a more caring and responsive society.27

I started this chapter with my image of teaching and learning as a dance. I was quite delighted to find this metaphor used in the reconstructivist curriculum world. ‘Child and curriculum, learner and teacher, self and text, person and culture dance together to form a complex pattern - ever changing, ever stable, ever alive’.28 My Celtic spiral image connecting sustainable education with inquiry theory and inquiry practice is now replaced with one derived from the mathematics of chaos theory to reflect the dance of complexity and chaos. These spirals, like inquiry, are not rigid, carved in rock; they are dynamic, moving and infinitely entwined.

In this chapter, I’ve looked at some of the essential understandings from educational philosophy that support the implementation of inquiry learning and affirm its position as supporting teaching and learning for sustainable education. Understanding and being able to articulate this theory re-assured school stakeholders that inquiry learning was not some new radical idea without theoretical foundations. But understanding the theory was not enough to develop good practice. The next chapter considers the research and thinking on the practical elements that can help build successful inquiring classrooms.

NOTES

BEHRENBRUCH

27 Wickersham, E. (2002). Ibid. (p. 129)