

ROB091600

Authors: Margaret Robertson and Mary Burston, La Trobe University and Andrew Fluck, University of Tasmania

Title: Negotiating the maze: the challenge of contemporary Australian learning landscapes

Abstract: This paper refers to organisational theory to explore and explain weaknesses and strengths of systemic change. It draws from three case studies in Australian secondary schools to illustrate the fragile and unpredictable nature of change associated with the digital contexts of learning and teaching. Although computers have been part of Australia's educational landscape for more than twenty years, the evolution of digital pedagogy continues to be a work in progress. What is envisioned in policy and what is experienced 'on the ground' at school level where change is to be implemented are distinctively different assignments (Baskin and Williams, 2006; Beetham and Sharpe, 2007; Conole and Oliver, 2007; Galloway, 2008; McGregor Tan Research, 2008; Willoughby and Wood, 2008).

Critical to the transformation of Australian education is the identification of the nature and management of change processes to discover how specific change agents (school principals, teachers, students and research team members) mobilise change factors and events in situated contexts. Personal styles, pedagogical sensibilities, motivation and attitudes of learning and teaching agents are embedded, contested, confronted and challenged on a daily basis. Our view is that theory needs to be contextualised and co-constructed in a field where hearts and heads construct the terms and rules of learning, teaching and change. The theoretical argument reflects the complexities, compromises and challenges that arose from a recent ARC project in Australian secondary schools and will illustrate how informal and formal strategies and responses construct the conditions and possibilities of change. We seek to explain the change dynamic through an alternative theory adapted from 'maze' logic. Maze logic helps to conceptualise the nature of the *ad hoc* responses that are part of the daily rhythm of the learning spaces we know as 'schools'.

Introduction

In this paper, we contextualise how desires to produce a new typology of learning associated with the 'knowledge economy' shapes the field of contemporary education. In explaining change principles, we refer to organisational theory approaches. We then report case studies and analyse a selection of responses to illustrate how pedagogical change is interpreted in learning and teaching contexts. We offer an alternative term of 'maze' theory that more accurately reflects the *ad hoc* nature of change in situated contexts of learning and teaching in schools.

The world 'out' there

Global neo-economic rhetoric has penetrated the language of governance in Australia since the 1980s. With the brief to reform 'old' order patterns of work, thinking and learning and knowledge acquisition, governments worldwide seek to reshape educational agendas to trigger new waves of economic and social capital.

Accompanying the processes of managerial change is a vocabulary of new literacies and knowledge framed by access and interaction with IT technologies.

The reform of industrial practices is characterised by the major move from traditional notions of capital-industrial assets to one placed on the asset value of intellectual-capital (Moore and Craig, 2008, pp.10-17). Rather than being machine minders or workers waiting for instruction and direction, workers will apply their own thinking to workplace problems and demonstrate competencies and technological know-how in workplace situations. New management and economic structures will rely on capitalising synergies between information technologies and intellectual capital. Alongside the transformation of industrial and economic spaces, commensurate technological transformations in communications, internet and computing have transformed work and learning. ICT technologies allow users to interact with domestic and global audiences on any topic of interest. The value of knowledge has changed. Through You-Tube, Twitter, blog, Second-Life, email, we produce online content, create knowledge and share information without waiting for to be trained by educational experts.

The 'digital' native

Although computers have been part of Australia's educational landscape for more than twenty years, the evolution of digital pedagogy continues to be a work in progress. Learning in the digital age proposes a different set of expectations concerning learning applications, skills, content, competence and capacities. Despite consensus on the need for greater integration of ICT technologies in all Australian education sectors, there 'has not yet been a transformation in the way learning occurs' (Kearns, 2002, p. 14). The brief for change is extensive as, people, infrastructure, content, applications and services, policy, organisational and regulatory frameworks are subjected to reform processes. Critical hurdles remain, such as, infrastructure and affordable access, skills, and quality of online information and services. Showcased examples in Australian educational experiments and elsewhere reveal what can be achieved to enhance educational outcomes and learning experiences through the use of multi-media applications, hand-held portable devices, e-portfolios, podcasts, iPods, MP3 files, and social networking sites and interfaces. Barriers to participation include; pedagogical issues, technological considerations, connection problems, lack of teacher proficiency in ICT, school governance, and the regulation of digital content in schools. Educational reform policies desire to promote 'blended, synchronous and asynchronous access to learning...in order to develop...new forms of conceptualisation and meta-cognition...and ...higher order thinking skills' (MCEETYA, 2008, pp. 3-12). How schools respond to reform aspirations for revolutionising current pedagogy is the question under review in terms of delivering the learning needs of students in a multi-modal, multi-media, multi-purpose, multi-facilitated, multi-technological society.

Inconsistencies between what is envisioned in policy and what is experienced 'on the ground' indicate that change does not always follow in the systemic manner indicated in reform policies (Baskin and Williams, 2006; Galloway, 2008; McGregor Tan Research, 2008; Willoughby and Wood, 2008; Beetham and Sharpe, 2007; Conole and Oliver, 2007) But harnessing technology to deliver the learning needs of the 'digital' native is more complex than the provision of technological services. To have an 'e-confident system' requires collaboration between *all* change agents, including learners, parents, employers, teachers and principals, corporate partners and community members (BECTA, 2008). *All* change agents need to participate in change processes to align and synthesise their expectations of teaching / learning needs in an era of 'exponential change' where technological innovation render 'old'

ICT technologies and applications redundant, such as video and television, phone and multi-internet access and applications onto mobile phone platforms (Prensky, 2007). What happens at the global level may not reflect what is happening 'on the ground' in terms of how social actors perceive agency and change within totalising systems. While globalisation represents a critical metaphor in the reform agenda of Australian education, location is a critical metaphor for our purposes when reporting on responses to change in learning and teaching contexts *in situ*.

Change theories, concepts and metaphors

As a systems theory, globalisation is a central metaphor for organisational, social and educational change (Rudd and Gillard, 2007-2009). Policy logic relies on strong positive correlations between technologies, funding, system alignments and learning outcomes. The problem with system theories is that their organising principles assume that objectives (desires for educational reform) and alignments (educational workplaces) are aligned. There is an expectation that these will articulate systematically in terms of organisational alignments. In developing a way to theorise current policy rhetoric, transmission metaphors are dominant. A transmission model holds these assumptions. The sender (S) expects the message (M) to be interpreted in the same way by the receiver (R). More importantly, the sender (s) expects that the receiver (R) will act upon the message (M) in the same way as the sender (S) expects them to (Shirato and Yell, 2000).

The transmission concept was a dominant pedagogy in the earlier phases of industrial capitalism. Taylor and Ford believed that greater productivity could be achieved through basic input-output processes and organised work flows. Learning practices and learning workplaces were aligned systematically and hierarchically. Students had no voice. They passively received learning from authority figures and canonical texts. Didactic pedagogies acquired legitimacy (Lankshear, 1996).

As organisational metaphors, systems theories were less secure premises when subjected to post-structuralist, deconstructionist, feminist theories of marginalisation and inequality, power and agency. Educational reformers desired to loosen the stranglehold of bureaucratism in teaching / learning workplaces during the 1960s (McLeod, 2006, Miller, 2007). Progressive schools allowed some level of autonomy, although for learners and workers, transmission frameworks of control and authority were retained.

If 'old' responses to reforming education industries and economies were characterised by linearity, contemporary responses are characterised by the possibilities of multi-modality and multi-functionality. Boundaries associated with 'old' hierarchical structures are seen as disabling factors. Flatter, flatter, flexible and cross-functional networks describe the digital enabled workplace (Clegg and Hardy, 2006, pp. 425-444; Schulz and Hofer, 1999). Work behaviours and working practices are heterogeneous, dispersed and interrelated, loose and structured with actions, strategies and responses continually reviewed and changed (Arthur, Dulauf, and Lane, 1997; Maguire, McKelvey, Mirabeau and Öztas, 2006; Norberg, 2008). Metaphors of flexibility, transparency, co-operation, and partnership have characterised recent reform agenda for Australian education sectors. Like its internet counterpart, learning to learn in the 'new' knowledge economy is shaped by a dynamic landscape of continually changing references of knowledge and learning activities. As indicated in the following excerpt from policy statements education policies preface the need for Australian schools to reform their pedagogies:

Pedagogy involves much more than...the tasks that teachers set. It includes the ways in which teachers interact with students...how they question and respond to

questions, use students' ideas and respond to students' diverse backgrounds and interests...teachers also need to think about how they link and sequence activities and how and what they assess (DEandT, 2005).

Change metaphors articulate complex, multi-dimensional interplays between historically, socially and culturally reproduced pedagogies (Calhoun, Carteris, Moody, Pfaff and Vink, 2007; Edwards and Usher, 2008; Goodwin, Peck and Freeman, 2006). With pressures on teachers and schools to comply with policy visions for delivering 'clever' workers, how learning and teaching contexts reflect those capacities in pedagogical contexts is the focus of the next part of the paper.

The case studies

Focus group interviews were conducted at the beginning and end of the research period in 2008. Years 7 and 9 students, class teachers, principals and school leaders were asked for their opinions about how they adapted to the change contexts of using a different form of technology (personal digital assistants or PDAs) in learning and teaching situations. Parents were also included in the focus-group schedule, unfortunately none responded, meaning that we were unable to gauge their responses to how their student children were learning outside school. These case studies reflect how change processes and pedagogies were experienced within specific schools. Schools are located in Victoria and Tasmania. All schools are de-identified for the purposes of reporting. The pseudonyms given for the schools are designed to capture elements of the perceived cultures. They are respectively 'Enterprise', Lavender Hill, and 'Meadow Glen'.

School 1: Enterprise

This school is located in inner Melbourne and continues to educate students at this landmark site. Its 'old' buildings display the architectural heritage of Edwardian Australia where classrooms were separated by curricula and learning activity as well as by the architectural constraints of long hallways and separate classrooms. Its educational journey came to a standstill in 1992 but with strong community support to overturn previous educational policy, it was able to re-establish itself as a government secondary school in 2004. Student and teacher populations have increased exponentially with a full range of offerings from Year 7 through to VCE. Its 'new' architecture is fluid in design, colourful and refracts light and open spaces. The new building symbolises the breaking down of boundary walls. The workplace and architectural philosophy at the 'new' Enterprise school symbolise 'new' learning environments and connote openness, flexibility, transparency and fluidity instead of the rigidly structured and monitored apparatus of the teaching and learning architecture that symbolises the history of the school. Knowledge practices and learning behaviours are encouraged across all year levels through partnerships between students, teachers and community (parents and others) and with a curricula focus on three pillars of learning: inquiry (research and development of self-directed knowledge inquiry), toolbox (skill development) and personalised learning frameworks. *Enterprise* school subscribes to democratic learning / teaching partnerships rather than autocratic pedagogical structures and welcomes innovative learning pedagogies using ICT technologies. Students use teachers' first names. Informality is encouraged. The school has no formal uniform.

Learning / teaching / technological alignments

Enterprise school is in the process of rebuilding its educational future. In terms of alignments with 21st century learning and teaching, teachers, school philosophy,

school leadership groups, appear to support consensus and partnerships. The educational philosophy at *Enterprise* school is strongly focused on encouraging students to develop their own learning, be responsible citizens within the school and local community, and takes the social and emotional development of young learners seriously with strong policies on anti-social behaviours at school, such as bullying. Its 'whole school' ethos of 'whole-community' learning provides support frameworks for students to do so. While educational visions are aligned with desires to provide the best means of delivering the learning and knowledge needs of the 'digital' native, its ICT infrastructure and resources represent the past. Its ICT resources are 'old', meaning that students learn with computers aged between 4-7 years with large TV-like screens. These cumbersome technological megaliths from the 1990s were to be progressively decommissioned when the school would receive its allocation of funding for ICT refurbishment. ICT technicians made the computers as functional as they could in terms of internet connection and software applications. Individual access required great patience. To supplement the lack of individual access to stand-alone computers in class time, lap-tops are borrowed from the library or other classes. Connectivity could not be guaranteed as the school was in the process of changing ISP providers. The teaching / learning workplace was far removed from the idealisation of ICT enablement in educational policies. Despite having a problematic ICT infrastructure, the principal from *Enterprise* school agreed to have Year 7 and Year 9 students involved in learning to learn using mobile devices.

How students perceive their learning workplace - Year 7 students

Enterprise students were refreshingly candid in their opinions. It was expected that they would reveal their sense of alignment with the positive learning culture *Enterprise* school supported. Six weeks had elapsed since the implementation of the project. Following analysis of their comments there appeared to be a consistent set of themes. These are reflected in selected comments that follow.

Potential: *..the good things about the PDA is that we can research things, look things up and use them for a lot of purposes...we got to know them...in two hours...they are good all around....*

Negativity: *..the bad thing is that we have not been able to use them everywhere...we were stopped from using them...we weren't allowed to use them...we get to use them on Monday and Friday which basically defeats the purpose of having them...*

Reasons: *teachers...because people mucked about and that...they would get their phones and put Blue Tooth onto them...*

Discipline issues: *...in our class like five of the kids do like horrible work and then the teacher says like 'Oh, our class is like all bad' and all of that and it is really only five people... five kids in our class...they do not listen and do not pay attention and they just get PDA's out like play games and listen to music and things like that....*

Teacher strategies: *...the teachers just say "No you can't listen" and then the whole class can't listen even though the other class uses them for good purposes of looking up things and they just say that you can't use them and then up to week six we have not been able to use them in any class which really defeats the point of having them as I said before and we can only use them on Mondays and Fridays in special classes...*

Punishment: ..We haven't been able to use them half of the people mess around and then our class gets a reputation for it.... half the time they say no because it is such a bad class, our class has a real reputation because of the five people.

Disengagement: ...disappointed... annoyed...as I said heaps of times before it basically just completely defeats the purpose of using them, of getting them and then also we have to pay the fee if we loose them it costs money, it is just annoying that we have got these things that are good technology but we just can't use them at all because some people have screwed around....

Connectivity: ...we don't have the internet because they haven't set up the internet... They haven't told us our pass codes.... they won't connect it to the wireless yet for some reason.... when I get home I have my own server and my PDA automatically connects to that...

Student attitudes to the teaching and learning culture of *Enterprise* school showed up inconsistencies between the school's vision for innovative ICT pedagogies and the manner in which the classroom teacher coped with change events. What students encountered at *Enterprise* school was a regimen of disincentives, ranging from whole class punishment, complete exclusion from using PDAs, to being labelled as a problem class. *Enterprise* students clearly articulated the potential of technologies through giving examples of what they could achieve. Teachers prevented them from realising those opportunities. In this learning experiment, the teacher's response to change was perceived by students as a threat to order and discipline. They had to cope with being labelled as 'a bad class' and live with this underserved reputation in the school. Students reported how quickly they learned how to use the PDAs and expressed interest in being able to use them in class and elsewhere because it meant they could change the way of learning.

In the following exchange, the interviewer attempted to find out how the students were using the PDAs in their learning area.

Interviewer: ...getting back to your fitness testing, what was the objective for you recording them on?

Student: you put it all onto the program and you can lose the sheets we wouldn't have to do it again because the sheet isn't as valuable as the PDA... so we can actually keep more track of the PDA than the sheets... it is just if it gets lost kind of thing and we basically just don't use them...

Interviewer:: A big responsibility I suppose?

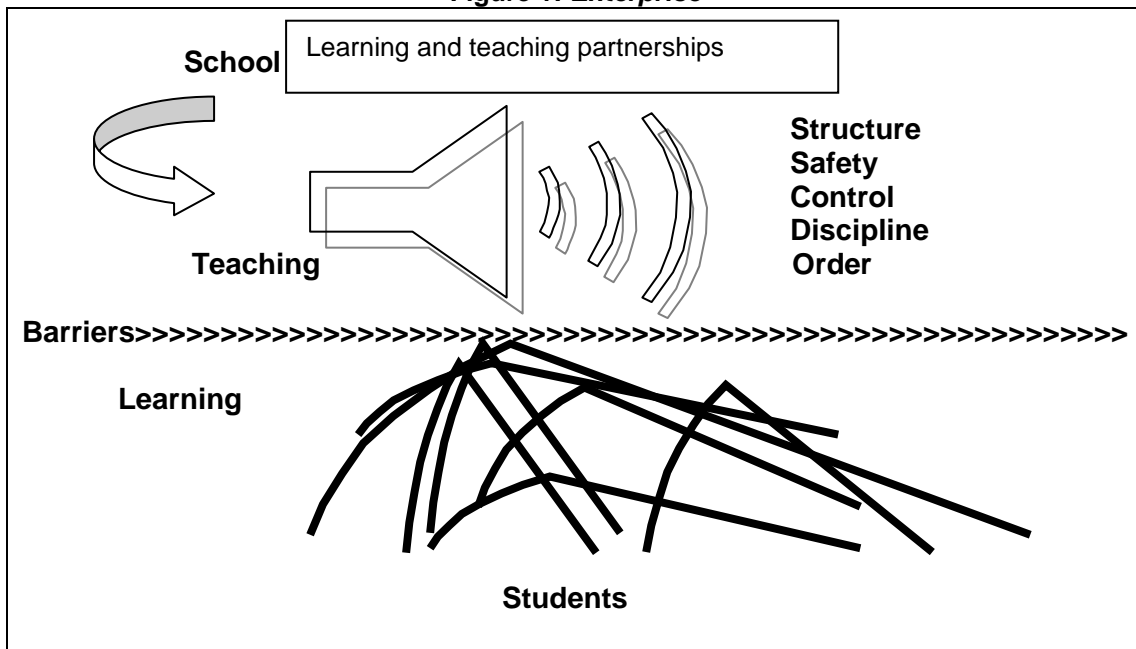
Student:... Yes it's \$500 and we don't even use it... our parents allowed us to use it but it just the fact that we don't even use the thing and if we lose it we lose \$500....

Year 7 students at *Enterprise* school were well aware of technological costs and knew that their parents entrusted them as responsible users. Yet the teacher at *Enterprise* school appeared to project anxieties and concerns about the potential loss of equipment. Students' learning experiences were characterised by distrust, fear, suspicion, anxiety and negativity. They missed out on the opportunities to create learning experiences through supported and integrated ICT pedagogies and systems. Students perceived the teacher as a negative agent who imposed barriers, unnecessary discipline and control. Students were disempowered and disengaged. They were not overly concerned with occasional unruliness or disruption from their

peers. To them, it appeared that the teacher strove to retain control in case experimentation with the technology took off in unpredictable directions. Writing on worksheets was a simpler option, easier for the teacher to manage in case equipment was lost. The teacher's workplace was threatened by the 'messiness' of change (Arthur, 2000). As Arthur recognised, messiness is vital because it provides ways of dealing with the complexities of systems change so that simpler and more plausible models can be put in place. Figure 1 illustrates how system alignments between teacher and students were framed.

Positive and supported learning school cultures do not necessarily guarantee synthesis of alignment between system objectives, teacher pedagogy and learning context. Structures at *Enterprise* school appear to be strong but student learning experiences are weakened because of pedagogical responses within the specific classroom. Change is translated as a challenge to pedagogical order.

Figure 1: Enterprise



School 2: Lavender Hill

Like *Enterprise* school, *Lavender Hill* celebrates its history and recently reached its centenary. It is a rural school delivering Year 7-12 curricula as well as TAFE / VET and partnerships in learning options. Established in 1909 in Lavender town, the school now caters for 1200 students. It is undergoing extensive rebuilding, starting with providing contemporary facilities for senior students and progressing with the demolition and rebuilding of the 1950s classrooms. Photos, images and artefacts gathered from former students and teachers, students' service in war, sports trophies remind the visitor and student of the long connection the school has had in the local community. These signs reinforce a sense of continuity. A former student is a federal minister currently serving the Rudd Labor government. *Lavender Hill* is engaged in a number of change processes including the reorganisation of staff and resources and an appointment of a permanent principal. The school's philosophy is based on the principles of supporting safe and supportive learning environments. It places high expectations on student behaviour and achievement in community-supported

contexts. It has a uniform policy and does not allow mobile phones to be used during school times. These are locked up for safety in students' lockers.

Learning / teaching / technological alignments

A historical stable entity, *Lavender Hill* has had to cope with rapid transition of staff within the school. During the life of the project, senior staff acted as temporary stop-gaps until a permanent (fourth) principal was appointed. The project team was required to re-negotiate the project with respective acting principals so that it could proceed each year. With uncertainties about the permanent replacement of the principal, teaching staff had the added responsibility to ensure that students' learning environments were not negatively affected by continual turnover. This was balanced by senior teachers to ensure stability and continuity in core teaching areas. *Lavender Hill* was fortunate to have a highly experienced ICT technician whose professional and technological expertise provided the school with the means of overcoming problems with the internet and with PDA access. That person has now left and the role shared between temporary and part-time ICT support personnel. The e-learning co-ordinator position has been vacated and a new appointment made last year. The e-learning co-ordinator was responsible for developing e-curricula and pedagogy in the school and was a critical partner between the school and the research team.

How teachers perceived their learning workplaces – Year 9

These focus-group interviews allowed a way for teachers to reflect the nature of learning / teaching and technology alignments in the school, particularly as their experiences were critical to understanding their responses to changing pedagogical contexts. Comments are grouped below under the themes that emerged.

ICT systems:

Teacher 1: *issues with emails... went on for two weeks... the kids logged on and then they couldn't get onto email and so they had to wait another week and then we got them on and then there was a confirmation date error on the Moodle website...that took a week or so and then the last couple of weeks we have had the internet issues so we haven't been able to do so it has just been a pain...to be honest.*

Teacher 2: *we have had some real issues with our internet service provider...they elected to do an inline upgrade and replacement of a production server and blew the course...then told us...four days after the event that they had actually done it and then we were just totally stunned, we were wondering why we were getting, you know why nobody is connecting and every time...his (teacher 1) class...were down ... it just made life very complicated.*

Organisation:

Teacher 1: *We don't know who is taking the class because we don't know who is teaching Year 9's so we don't have the timetable.*

...the thing is, like you know my issues with me having to do it as a Health teacher, I have only got three periods with them I need to get as much prac in as I can and the fact is that I have gone to a computer room every week and through no-one else's fault I have just not been able to get on...

...Our Year 9's go to...another campus and they are away for a term so kids will only have only a semester or a term unit. So depending on who has got what and when it is on will depend on if they do Health...kids don't do much Health.

Potential:

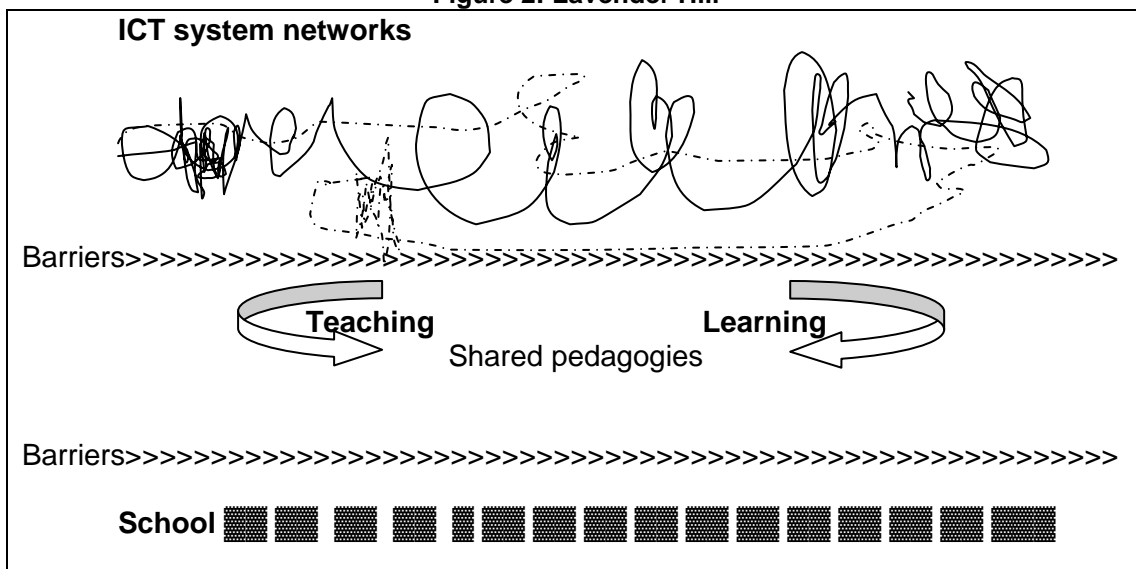
Teacher 1: *Yeh they do love the PDA's, you see them sitting around the yard and things like that, one of them has got his entire timetable on it he just checks what he has got where and...*

Teacher 2: *We were using them a lot last topic with the graphing and that and they were doing a lot of data collection too... for outside we can use them for that.*

Alignments at *Lavender Hill* were characterised by stoppages, delays, break-downs in communication and information flows, and the rapid turnover of key personnel who had knowledge and experience to guide the teachers through technological requirements. Events such as changing over ICT service provision or updating the school's ICT infrastructure impacted negatively on teachers' aspirations to develop innovative pedagogical responses. At *Lavender Hill*, teachers were positively aligned with the potential for creating positive learning experiences and knowledge when using the PDAs. They did not perceive the PDAs as a problematic or in terms of having to manage student behaviour, rather they expressed the difficulties of coping with the 'messiness' of alignments between teaching, learning and technology that prevented them from developing innovative and creative pedagogies that could be adaptable and user-friendly for students. In *Lavender Hill*, system alignments and pedagogies are represented in Figure 2.

Lavender Hill illustrates a different organisational pattern of alignments. School is at the bottom of the diagram and represented as a broken chain. Thus fragmented, the organisational system is characterised by gaps like those experienced in actual learning and teaching situations. ICT system networks are signified by entanglements with little clarity or confidence of alignment of connectivity critical to learning / teaching needs. Alignments between students and teachers are shown to be inclusive and shared. Each aligning field operates as a separate entity within the overall organisation of the school.

Figure 2: Lavender Hill



Here, operating environments are weak but teaching / learning environments are stronger. Organisational structures are fragile but teacher pedagogy is resilient. Learning / teaching environments are responsive to students' needs but compromised by outside events that impact on teaching / learning experiences. Local contexts and events are significant in shaping strong / weak alignments. In this

context, teachers disengaged from the change process because of the unreliability and fragility of system structures. In this school, having too little structural support and little integration of alignments contributed to lack of cohesion.

School 3: Meadow Glen

In comparison to the student population at *Lavender Hill*, *Meadow Glen* has a relatively small enrolment of 500 plus students from Year 7 to Year 12. It is located in Northern Tasmania. Like its Victorian counterparts, *Meadow Glen* has a long history of secondary education and was first established in the 1920s. The school architecture is relatively new, brick and visually pleasing. It is about 3-4 kilometres from the nearest town. Policies on uniform, mobile phone and ICT use in school, responsibilities of parents, students and the school are spelt out in detailed information books. The school encourages students to become independent learners capable of making informed choices. An extensive curriculum includes core subjects as well as extra curricula activities.

In reporting this case study, observer case notes are used because these help to illustrate a shift in alignments between teachers and students in classroom situations. For the purposes of reporting, the observer ranked the learning environments of respective classrooms at Year 7 and Year 9 levels. Frequencies are shown for Year 7 and Year 9.

Table 1: Student /teacher relations – Years 7 and 9

		Satisfactory=2	Very good=3	Positive responses=5
Year 7	Engagement with students	4	12	26
Year 9	Engagement with students	14	4	4

Although limited, the data indicate a weakening of the teacher / student alignment between Years 7 and 9. *Meadow Glen* has strong support structures within the school system that are available to students yet the data point to the influence of classroom context on the nature of teaching / learning alignments. Illustrative are the following interview excerpts from the observer's notes.

Classroom contexts: Year 7

The Teacher was somewhat embarrassed by difficulties encountered in the 1st lesson with PDAs....However, most problems were overcome, PDAs were incorporated into the lesson and teaching / learning program got underway... Within ten minutes, all students logged on and accessing aspects of website specified...students called to see teacher's screen to demonstrate how fitness template to be filled in using info from powerpoint...5 mins later half working....

Evidence of students helping others...

Teacher: organises situations for students to meet learning objectives

: ICT interactive with on-line learning activities

:Defines learning objectives for class

:Presents topics with a logical sequence

End of lesson each student sends teacher an email of 'fitness' fact learned.

Classroom contexts: Year 9

The Teacher is working proactively with individuals, but not a high level of engagement with the class...group of boys playing games (persisted despite requests by teacher)...some pairs (couples) quietly engaged on other things... Generally...disorganised and chaotic...Students doing their own thing- in an out of room – teacher under siege, preoccupied with individual matters. Little sustained interaction with the learning object apparent...

We conclude that students' learning habits were disrupted by a change in the type of learning technology used in classroom contexts. Year 7 teachers had as much frustration with ICT connectivity and access as teachers had at *Enterprise* and *Lavender Hill*. At *Meadow Glen*, Year 7 teachers led their students through those difficulties whereas at Year 9 level, students did not appear to have the same resilience. Their attitudes appeared to suggest some rigidity when it came to experimentation with 'old' technologies inasmuch as how their perceptions were shaped when the PDA was presented to them. When asked about their preferences for doing schoolwork on a computer through a prepared unit or whether with the teacher taking the class as normal – there were equal yes and no responses. When asked to reflect on their learning experiences with PDA technology, the majority response was negative.

Students' responses to this observation reveal their frustrations with the technology. When asked 'why do you think you did not learn well using the PDA?' responses included:

*It didn't work properly. I didn't like it...I found it to be annoying
It's too old...*

I didn't use it that much...maybe if they were newer it wouldn't be so bad...

I had trouble useing [sic] it didn't no [sic] how to put music on it...

It was too small to read and to complicated to use...it was too old technology and it was really slow...much prefer a laptop...

It was hard to use and annoying and it was old...

It would take too long to write things down on the PDA...

At *Meadow Glen*, the relative age of technology seemed to influence students' perceptions about the learning value of PDA devices. At Year 7 level, technological age did not appear to hold as much significance. An explanation could rest with the organisational structure within specific classroom contexts. The messiness encountered by Year 7 teachers was balanced by positively engaged alignments whereas as Year 9 level, these alignments were characterised by disengagement and disruption. Alignments in the organisational design of the learning workplace at *Meadow Glen* are expressed differently. We attempt to represent this context in Figures 3 and 4.

Figure 3 represents an alignment configuration suggested by symmetry and coherence. Figure 4 represents disembodiment and disengagement. Empty spaces characterise random and ambiguous locations within the organisational structures of the school and specific classroom contexts. The problem represented here is displacement.

Figure 3: Meadow Glen – Year 7

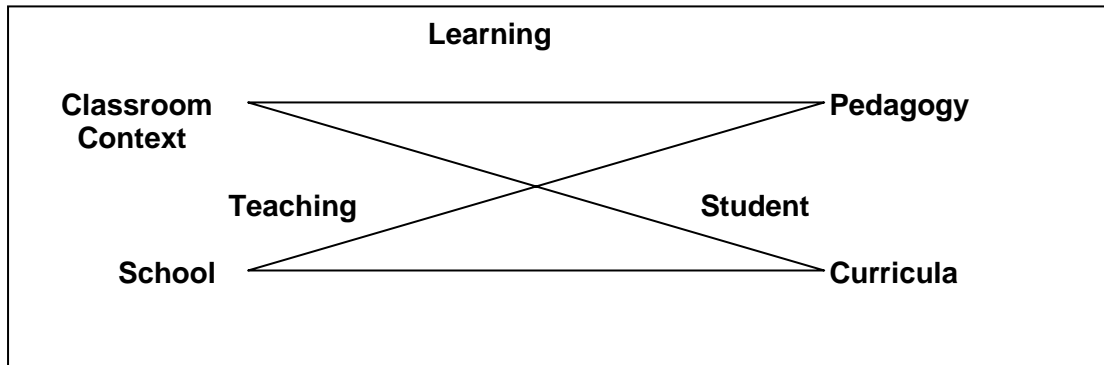
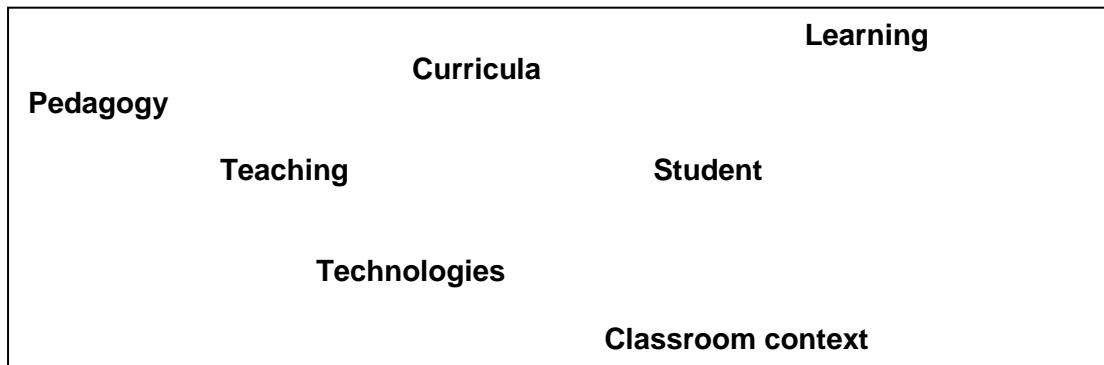


Figure 4: Meadow Glen – Year 9



Conclusion

Different configurations of alignments suggest chaotic organisational structures and disordered alignments. Complexity theory recognises the implications of metaphors and meanings, and that organisations consist of interactive, non-linear, short-range, and positive-negative feedback loops. A characteristic of complex systems is that individual elements seem to be immersed only in their own responses and ignorant to what is happening at the global system level. Complexity theory offers an alternative way of theorising the vagaries of organisational ‘science’ for there is more to see behind the apparatus (Porter and Powell, 2006). Moreover, decisions are rarely rational but are subject to emotions such as fear, joy, pride and anxiety (Fineman, 2006).

The evidence presented from these three case studies suggests that alignments within totalising systems do not conform to one organisational model. At *Enterprise*, the teacher’s behaviour contradicted the expectations of the school system. It was perceived as negative by students although the teacher may well have believed that a managed class was evidence of constructive pedagogy. At *Lavender Hill*, global system alignments were fragmented and dispersed. The operational structure of the school characterised a silo culture. The critical difference was teacher resilience. At *Meadow Glen*, alignments between system objectives, pedagogy and learning, appeared to be influenced by specific classroom contexts. Year 9 students placed significance on the age and functionality of technology and reported negative feedback concerning their learning experiences with PDAs.

School 1 withdrew from the project. School 2 temporarily withdrew and re-engaged with the project in 2009. School 3 continues with the project. The interrupted nature of engagement required an interpretative framework that was flexible enough to portray unpredictability without the assignment of a negative term such as failure. We consider that a 'maze' theory framework reflects more accurately *ad hoc* contexts of learning and teaching in schools and continue to clarify the meanings that may be drawn from this approach.

References

- Access Economics (2009). *The Australian Economic Sector and the economic contribution of international students*.
<http://globalhighered.files.wordpress.com/2009/04/theaustralianeducationsectorandtheeconomiccontributionofinternationalstudents-2461.pdf>. [accessed 10/4/2009]
- Arthur, B.W., Durlauf, S. N., and Lane, D. (Eds) (1997). *The Economy as an Evolving Complex System II*, Proceedings Volume XXVII, Santa Fe Institute Studies in the Science of Complexity, Reading, MA: Addison-Wesley.
- Arthur, B.W. (2000). *Cognition: The Black Box of Economics* in D. Colander (Ed) *The Complexity Vision and the Teaching of Economics*, Northampton, Mass: Edward Elgar Publishing.
- Australian Development Gateway,
<http://www.developmentgateway.com.au/jahia/Jahia/pid/4709> [accessed 16/4/2009]; Hand Held Learning Forum UK <http://www.handheldlearning2008.com/home>
http://cms.curriculum.edu.au/anr2004/ch9_teaching.htm.
- Australian Government Canberra, (2007). *Schooling / Building The Education Revolution*, <http://www.deewr.gov.au/ /Pages/default.aspx> [accessed 10/4/2009]
- Baskin, C., and Williams, M., (2006). ICT integration in schools: Where are we now and what comes next? *Australasian Journal of Educational Technology* 2006, 22(4), 455-473.
- BECTA (2008). *Emerging technologies for learning: volume 3*. Available at www.becta.org.uk [accessed 10/4/2009]
- BECTA, *How to teach with technology: keeping both teachers and students comfortable in an era of exponential change* (Marc Prensky)
http://partners.becta.org.uk/upload-dir/downloads/page_documents/research/emerging_technologies07_chapter4.pdf [accessed 10/4/2009]
- Beetham, H., and Sharpe, R. (Eds) (2007). *Rethinking pedagogy for a Digital Age*, London and New York: Routledge.
- Caldwell, B.J., and Hayward, D.K. (Eds) (1998). *The future of schools : lessons from the reform of public education*, London ; Washington, D.C.: Falmer Press.
- Calhoun, C., Certeris, J., Moody, J., Pfaff, S., and Vink, I., eds., (2007). *Contemporary Social Theory*, 2nd Edition, Carlton, Australia: Blackwell.
- Campbell, A., and Luchs, K.S. (Ed.) (1999), *Strategic Synergy*, USA: International Business Press.
- Conole, G., and Oliver, M., (Eds) (2007). *Contemporary perspectives on e-learning research*, London and New York: Routledge Falmer Learning.
- Edwards, R., and Usher, R., (2008). *Globalisation and Pedagogy: Space, Place, and Identity*, London: Sage.
- Galloway, J. (2008). *Harnessing technology: for every child matters and personalised learning*, London and New York: Routledge.
- Goodwin, N., Peck, E., and Freeman, T. (Eds) (2006). *Managing Networks of Twenty-First Century Organisations*, Basingstoke: Palgrave Macmillan.
- Griffin, R. (Ed) (2002). *Education in transition: international perspectives on the politics and processes of change*, Oxford, U.K: Symposium Books.
- Hill, D. (Eds) (2009). *The rich world and the impoverishment of education: diminishing democracy, equity and workers' rights*, New York: Routledge.

- Kearns, P. (2002). *Towards the Connected Learning Society: An International Overview of Trends in Policy for Information and Communication Technology in Education*, Canberra, ACT.
http://www.dest.gov.au/sectors/higher_education/publications_resources/summariesbrochures/towards_the_connected_learning_society.htm [accessed 15/4/2009]
- Lankshear, C. (1987/1989). *Literacy, Schooling and Revolution*. London: Falmer Press.
- D. Loader, A. McGraw, A., and M. Mason (Eds) (2007). *Jousting for the new generation: challenges to contemporary schooling* Camberwell, Vic: ACER Press.
- MCEETYA (2006). *Leadership strategy: Learning in an ONLINE world*, (2006), pdf
<http://www.mceetya.edu.au/mceetya/publications,11582.html#Schools%20Resourcing>
 [accessed 2000/01/2009]
- McLeod, J. (2006). *Citizenship for the future - educating the adolescent in 1960s Australia*, AARE *International Education Research Conference: engaging pedagogies*, Adelaide: pp. 1-13.
- McGregor Tan Research (2008) *Educators and ICT Usage: Market research report*,
<http://www.educationau.edu.au/jahia/Jahia/pid/664>. [accessed 5/05/2009]
- Moore, L., and Craig, L. (2008) *Intellectual Capital in Enterprise Success*, New Jersey: Wileyand Sons.
- Norberg, J. and Cumming, G. (Eds) (2008). *Complexity Theory for a Sustainable Future*, ColumbiaUniversityPress, New York.
- Perri6, Goodwin, N., Peck, E., and Freeman, T. (Eds) (2006). *Managing Networks of Twenty First Century Organisations*, Hampshire England: Palgrave Macmillan.
- Pick, D. (2006). *Higher education reform in Australia: a reflexive modernisation perspective*, 29th Higher Education Research and Development Society of Australasia International Conference: Critical, July 10-13 2006, pp. 268-275. Perth, Western Australia: HERDSA.
- Schulz, W.C., and Hofer, C.W. (1999). *Creating value through skill-based strategy – Entrepreneurial Leadership*, Oxford: Pergamon.
- Schirato, T. and Yell, S. (2000). *Communication and Cultural Literacy: An Introduction*, 2nd edition, Sydney: Allen and Unwin/London: Sage.
- Stacey, R., Griffin, D., and Shaw, P. (2000). *Complexity and Management - fad or radical challenge to systems thinking?*, London: Routledge.
- Stacey, R. D. (2002). *Complex Responsive Processes in Organisations - Learning and knowledge creation*. London: Routledge.
- Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*, UK: Cambridge University Press.
- Willoughby, T. and Wood, E. (Eds) (2008). *Children's Learning in a Digital World*, Oxford, UK: Blackwell.