The External Agent as a Creator of Complex Conditions for Change

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Abstract: A Hong Kong school, characterized by weak and retrospective leadership, is unresponsive to the demands of rapid changes in society and in the educational context. Internally, autocratic decision-making processes are entrenched, with staff feeling isolated and marginalized. The need for change was recognized by the school's sponsoring body, which arranged for an external consultant to initiate change in the school, through a longitudinal departmental and school development project. Complexity theory, in part a theory of survival and co-evolution, argues that an organism, faced with environmental stimuli, has an inherent ability and need to self-organize and seek perpetual improvement. It does so by developing an effective feedback system, which in turn promotes connectedness, both within its own system and with the external environment. This paper discusses how the school has benefited from the intervention of an external agent, who creates the necessary *complex* conditions for change (and what those conditions are), and the capacity for self-organization and emergence.
Keywords: complexity theory; change; external agent; feedback; connectedness; self-organization.

Prologue: the immunology analogy

In his 1996 book *The Web of Life*, Capra presents a synthesis of recent scientific breakthroughs such as complexity theory, Gaia theory, chaos theory, and other explanations of the properties of organisms, social systems, and ecosystems. In one chapter Capra describes how immunology has recently undergone a paradigm shift.

> Classical immunology sees the immune system as the body's defense system, outwardly directed and often described in terms of military metaphors – armies of white blood cells, generals, soldiers and so on… Recent research has shown that under normal conditions the antibodies circulating in the body bind to many (if not all) types of cells, including themselves. The entire system looks much more like a network, more like people talking to each other, than soldiers out looking for an enemy. Gradually immunologists have been forced to shift their perception from an immune *system* to an immune *network*.
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> (Capra, 1996, 278-9)

In short, the immune system is now perceived as a cognitive, self-organizing, and self-regulating network.

Adopting Capra's view of the web of life, the well-being of a school is not unlike that of a living organism, monitored by a cognitive, self-organizing, self-regulating immunological network. Taking this analogy further, an intruder into the school network would activate self-organizing and self-regulating processes which would eventually enhance the well-being of the school, instead of being driven out by military guards of the immune system. But is this true?

This paper describes some necessarily selective features of a departmental and school development project undertaken in a Hong Kong School, through which an external consultant was brought in to initiate change in the school. Adopting complexity principles, the external consultant sought to develop an effective communication and feedback system, which, in turn, promoted connectedness, both within the school system and with the external environment. This paper discusses how the school has benefited from the intervention of the external agent, who managed to create the necessary *complex* conditions for change, and the capacity for self-organization and emergence.

The School

The School in question, for the sake of anonymity, will be known as 'the School' throughout this paper. It was characterized by weak and introspective leadership, had proved to be unresponsive to the demands of rapid changes in society and in the educational context. Internally, autocratic decision-making processes were entrenched, with staff feeling isolated and marginalized. The Educational and Manpower Bureau had conducted a routine Quality Assurance Inspection (QAI) exercise in 2002, and had criticized the School for its weak middle management and teacher-centered pedagogy, resulting in students who lacked confidence and who possessed passive learning habits. The Supervisor of the School attended meetings which were dominated by long stretches of silence and autocratic procedures. The strategic plans prepared by the School for addressing the issues raised in the QAI report were conspicuous by an absence of innovative ideas, with the management suggesting more of the methods which had proved to fail – stricter discipline, most tests and examinations, and endless paperwork.

The Development Project

The development project was initiated by the Supervisor of the School in November, 2003. It set out to achieve the following objectives:

- To identify the priorities of the English Department of the School, in consultation with the staff in the Department.
- To identify the targets the Department wished to achieve, and define the criteria to be used to measure success.
- To devise strategies for achieving set targets and incorporate them in action plans.
- To decide on specific tactics suitable for carrying out the action plans.
- To check for readiness for initiating change and development.
- To create a development planning process with *evaluation* built in as an essential element.
- To enhance the leadership capacity of the School.
- To empower all staff in the English Department through involving them in every step of the project.
- To build on the competence levels of individual English teachers and help them achieve further development.
- To build a culture of continuous professional development in the English Department and eventually throughout the School.
- To foster a professional learning community in the English Department and eventually throughout the School.

It was designed to be a two-year project, but circumstances dictated that it is currently in its

third year of implementation. During the conduct of the project, several critical events took place which had telling effects on its outcomes. This paper reports some critical (crucial) turning points in the project, and analyses them through the lens of complexity theory.

Critical event one: the first visit

In January, 2004, a formal proposal was submitted to the School and a first meeting was arranged for the external consultant to meet the Principal, the Vice Principal who doubled up as the English Panel Chair, and all the teachers in the English Department. The first impressions confirmed the beliefs that the School was run with extreme bureaucracy and with very weak stakeholder voice.

Apparently neither the School management nor the English teachers knew what to expect. The objectives of the project were clearly stated in the proposal, copies of which were given out to everyone. But instead, the English teachers were told by management that an 'expert team' would come in to tell them how to teach English better, while the Principal kept pressing for 'performance indicators' to prove the value of the project. Bottom-up self-improvement and self-organization could not be further from their minds.

Amidst all this misunderstanding was a conceptual vacuum among the School staff. The suspicion was that the notion of 'change facilitation' is totally alien to them. To the Principal, the outside expert was there to diagnose the problems and prescribe curative measures. To some teachers, all class observations were judgmental and involved assessment of how well they taught. To others, external teaching experts such as university professors were more knowledgeable about 'new teaching methods' and could hence suggest some for them to follow. Action planning involving themselves was not really within their scope of comprehension.

This seemed a serious case of miscommunication and mismatch of expectations. Here we are faced with an example of Bourdieu's (1977) concept of the *habitus*, in this case of the typical traditional School which had been out of contact with the changes in the profession, education, and society.

Then one crucial incident took place in April, 2004.

Critical event two: the drive-out

On that day in April the School Supervisor was meeting the senior management of the School at the School, and the School Supervisor had made arrangements for the external agent to go through the details of the project as a late but important item of the meeting agenda. The external agent arrived at the School at the scheduled time, and was asked to wait in the General Office, with what had become customary indifference shown by the office staff: no smiles, no offer of anything to drink, and no attention paid during the waiting.

The waiting was longer than expected. About thirty minutes after the scheduled time, the external agent was eventually asked to enter the Principal's office. The Supervisor apologised for the long wait, and explained that the School management had serious misgivings about the project. They were not certain about the effectiveness of the project, and also wondered if the external agent was simply using the School for his own research purposes. The Supervisor asked

the external agent to respond to the two queries in front of the Principal and the two Vice Principals.

The external agent was put on the spot. Nevertheless he patiently explained that since the project would take place in phases, there would be checks and balances to ensure that quality service would be provided or else the contract could be terminated early.

The misgivings about the external agent's role as a researcher (he was registered for a doctorate degree and would be basing his thesis on the development project) and the suspicion that he might be unfairly biasing the design and implementation of the project to suit his own research motives and for supporting his Ph.D., in hindsight, were understandable. The external agent tried his best to convince the School management that the interests of the School would also take precedence during the project, and that his doctoral studies would only be an academic analysis of the context of the project and would not be dictating the conduct of events at the School. Indeed, his doctoral studies would be most beneficial in the long term as they would be feeding the external agent with useful concepts and implications in his effort to make the project successful.

The defence lasted about 20 minutes, with the 'judges' sitting in solemn silence. No verdict was returned. The Supervisor concluded the meeting by saying that he would have another meeting with the School management in the next week before deciding on whether to take on the project or not. His hands seemed tied.

The 'alien intruder' was apparently detected in the School system, and the immune system of the School went all out to drive it out. It took the wise decisions of the person who initiated the intrusion to ensure that the external agent was kept alive in the network, and would eventually function as a stimulant for self-organization and self-regulation.

Critical event three: the debriefing session

After the attempted 'drive-out', the School Supervisor contacted the external agent immediately to discuss how to salvage the project from the jaws of possible sabotage. Two important actions were swiftly taken by him, one logistic and one strategic. One of the objections to the proposed development project involved the costs that would be incurred. The Supervisor initially asked the School to absorb the costs, as the School would be the beneficiary of the results of the project. Eventually he decided that the sponsoring body would pay, and this would become a key factor in gaining the School management's support for the project. He would then tell the senior managers of the School, in no uncertain terms, that the sponsoring body was not satisfied with their performance, and that it expected quick improvements, and that the development project would be used as an instrument to feel the pulse of the School and to suggest viable ways to move the School forward. The strategy proved effective, and after further negotiations, the project received the 'green light' in May, 2004.

The various procedures of the first stage of the project, i.e. a situational analysis and needs analysis, using a questionnaire survey, class observations, and interviews with various stakeholders, subsequently took place in the ensuing few months. The external consultant felt

more and more welcome in the School, with students stopping by to talk to him voluntarily in the corridors.

The debriefing session following an initial needs analysis exercise was a crucial event in the whole project. It was essential for the School management to recognize that the School needed new, untried strategies to improve. Yet at the same time it was imperative that the senior managers of the School should not feel that their own power, credibility and vested interests were seriously threatened.

From previous discussion it was clear that the School management did not genuinely welcome the intervention of an external consultant. It was circumstances which dictated that they had to accept the project. There was, however, plenty at stake in terms of face, power and material interests, with the ultimate consequences loss of positions or jobs. Their own rather narrow understanding of educational management (their *habitus*) would probably lead them to perceive the external consultant as a wielder of authoritative power who would make judgments about the School, thus reflecting unfavourably on them.

The teachers, on the other hand, had long been suffering a sense of defeat which they knew they should not feel but yet found it hard to dispel. The ostensible distrust that the School management placed on them only served to intensify the feeling. To them, the stakes were equally high, again with loss of favour or even jobs, a realistic threat.

To the audience, the debriefing session probably carried the aura of judgment day, hence the anxiety for all parties concerned.

The strategy that the external agent decided to employ on the day was one of 'focus, unite and motivate'. He did not plan to play the judge and return a verdict on the teachers, the department or the School. Rather, he would begin with informing the audience that they had been doing a dedicated and professional job, but that the efforts often seemed unrewarded because of gaps and often misplaced foci in the system, and it was up to the whole School, with all its stakeholders, including School management, staff, students and parents to make a concerted effort to seek improvements. This was suspected to be the first time that the teachers had received any recognition or reassurance about their professional performance. They all paid full attention to the findings, especially to the part with regard to teachers' own evaluation of their effectiveness, and that concerning teacher-student relationships. This confirmed the external agent's belief that the teachers had the interests of the students at heart.

Dealing with the Principal and the Vice-Principal and English Panel Chair, required even greater tact and guile. The situational analysis findings indicated that many of the problems in the School could be traced to the inadequacies of the School management, not least the poor communication channels, which were mostly of the making of these two senior School persons. From the external agent's investigation, he was prepared to give them the benefit of the doubt in that they were simply oblivious to the issues. He, therefore, felt no qualms in focusing on how the School could enhance its communication channels and build close, trusting relationships between stakeholders, and, as a result, refrained from apportioning blame.

The external agent ended the session by showing three overlapping circles (of the School management, the teachers and the students) and elaborating on how these parties could all benefit from a close partnership through enhanced communication and trust.

Critical event four: the meeting

A meeting of significance took place in May, 2005, after the School Supervisor had privately told the external agent of the family decision to relocate to another country. Expressing regret at not being able to see through the development project, the Supervisor was adamant that the development project should commence on the right note. He suggested that he join a meeting which the external agent had arranged with the English teachers to discuss the formulation of development plans. He also suggested that the Principal join the meeting, and offered to make some opening remarks at the beginning of the meeting.

At the meeting, the School Supervisor spoke eloquently about the School's current situation and the urgent need for change and innovations. He also reiterated his full support for the development project, and his confidence in the teachers. He then opened up the floor for questions. Several questions were raised, all relevant ones, and the School Supervisor addressed each question adequately.

Both the School Supervisor and the Principal had to leave half way through the meeting. The external agent was left to chair the second half of the meeting himself, facilitating a discussion which would end up with teachers deciding on the areas in which their development plans would concentrate. The discussion was, to the external agent's pleasant surprise, animated and effective, with four areas identified and teachers arranging themselves into five development plan groups. The meeting apparently ended with an air of collective optimism.

From subsequent discussion with the teachers, the meeting proved a turning point in the credibility of the development project in the perception of the teachers. Perhaps the teachers had felt disillusionment with previous 'projects' initiated by the School on many an occasion, so they could be forgiven for dismissing the current development project as yet another whimsical idea of the Principal's making. It turned out that the School Supervisor's physical presence at the meeting, and his expression of unequivocal support for the project that it, together with the external agent, helped the development project gain a large measure of credibility. The fact that the School Supervisor openly expressed his confidence in the English teachers also allowed them to feel suitably empowered. It was only at this point that the bottom-up nature of the change process sank into the minds of the teachers. Hence their active participation in the devising of the development plans.

Critical event five: the School retreat

This was the most recent of the critical events mentioned in this paper, and took place in April, 2006. It marked an occasion on which various stakeholders of the School had the opportunity to discuss core values and address basic issues pertaining to the management and development of the School on an egalitarian basis.

The external agent was appointed to the School Management Committee (SMC) in the summer of 2005, and attended his first meeting at the end of August, 2005. After several meetings, he developed certain misgivings about the effectiveness of the SMC meetings.

To begin with, the meetings were sometimes too pragmatic in nature, with most attention paid to solving immediate and sometimes mundane administrative problems and much less attention paid to matters of educational principle. The fact that it was held in the afternoon with members secretly wishing an early adjournment did not help. The composition of the Committee did not guarantee equal and meaningful participation in discussions either. Some of the members seemed either short on educational expertise, or were far removed from the School situation, or both.

The external agent conceived an idea of organizing a retreat as a forum for the SMC to meet with School management and a portion of teachers to address core issues about the School. A whole-day, away-from-home setting would allow ample time and provide a relaxed atmosphere for stakeholders to exchange their honest views. This suggestion first gained the approval of the School Supervisor and then that of the Principal. More work was done to devise a coherent framework for the day's discussion and sensitive issues such as grouping and facilitation.

The discussion revolved around three main themes: the students (What qualities do we want to see our students possess on leaving School?), the teachers (What makes teachers happy in their jobs?), the School (What can the School do to help students acquire the qualities we wish them to possess and to ensure teachers are happy in their jobs?)

The process of eliciting views from the participants – members in the discussion groups were asked to draw their *idealistic* pictures about students, teachers and the School, and explained them to other group members – seemed to have worked very well. As the focus was on the 'utopian state', subtle criticisms about the shortcomings of School management could be made without causing too much loss of face. Participants became increasingly frank and forthcoming after an initial stage of inhibition, which lasted no more than an hour.

The highlight of the day was a plenary session when the party would, as a group, decide on how to turn suggestions into initiatives which involved action. The Principal and the two Vice-Principals were asked to form a panel and respond to each suggestion by examining its feasibility. To his credit, the Principal was patient and gracious when faced with comments from the floor. One Vice-Principal, on the other hand, sat solemnly with his face turned towards away from the audience, while the other sat silently with a smirk on his face. Apparently the general did not have the support of his lieutenants when the chips were down.

Apart from showing up the cracks in solidarity among the senior managers in the School, more importantly, the retreat narrowed the gaps in communication which had existed in the School for a long time. Most meetings, and even professional development sessions, were previously conducted in a top-down manner, with very little chance for bottom-up idea sharing. The three themes chosen also focused stake-holders' attention on the essential educational values of a School, instead of sheer housekeeping trivialities such as School uniform specifications.

The external agent was impressed with the courage of the teachers who spoke their minds, as well as their undoubted eloquence, and most of all, the underlying sense of professionalism. Some SMC members also admitted that the retreat was a revelation for them, when for the first time they heard the voice of the teachers.

Complex changes taking place in the School

In the almost three years since the initiation of the development project, significant, complex changes have taken place in the School. Complexity theory argues that living organisms have an inherent tendency to adapt to changes in the environment and hence self-organize for survival. Many of these changes take place in a non-linear fashion, with often a seemingly irrelevant factor causing change through a network of intricate relationships, i.e. the 'butterfly effect'. Organisms and systems also go through a process of 'self-organized criticality', when the effects of change are not felt for a period of time until a crucial single move causes hugely significant change. The actual changes happening in the School demonstrate complexity in this sense.

The School Supervisor who initiated the project decided to leave Hong Kong in the summer of 2005, as a result of re-deployment by the sponsoring body. The successor, who arrived in August, 2005, with vast school management experience, showed immediate endorsement of, and support for, the development project. The succession was almost seamless, with the added advantage of the two Supervisors taking on complementary roles, with the former Supervisor playing an enforcing role and the current Supervisor playing a supportive role.

Before he left, the former Supervisor exercised his power in two respects. He ensured that the Principal agreed to replace the ineffectual English Panel Chair and the equally ineffectual Chinese Panel Chair, who were perceived as barriers to innovation and change. This move proved crucial to the success of the development project. He then invited the external agent to join the School Management Committee, which eventually provided the agent with the power and platform to influence School policy. Such changes were strategically planned, and consequently contributed to the overall well-being of the School. Others seemed more incidental than planned.

In the summer of 2005, three English teachers resigned, for different reasons. Evidence suggested that these teachers were struggling to keep up with the pace of change. Subsequent evidence also showed that the remaining teachers, to varying degrees, embraced the proposed changes.

Were there traces of 'self-organized criticality', which prompted the personnel movements? Per Bak, in his 1996 book *How Nature Works: the Science of Self-Organized Criticality*, illustrates the concept of 'self-organized criticality' with the findings of his now famous sand pile experiments.

Imagine you drop grains of sand on the ground. Grain by grain you build up a cone-shaped hill. When you drop the next grain, it may trickle down the side, causing a minor landslide. If you continue the process, the hill may grow further in size, until it reaches a critical point when one more grain will cause a complete collapse. What is fascinating is that it is not possible to predict whether the next grain of sand will cause a tiny imperceptible shudder or a mighty

avalanche. The probability can be described by what mathematicians call a power law: there are many small disturbances and relatively few giant ones. But each of the latter comes as a surprise. Natural disasters such as earthquakes and economic phenomena such as stock market crashes, Bak avers, follow similar patterns.

Here we have a model of complexity happening at a critical point in chaos, or the edge of chaos, when a small action can lead to massive, unpredictable consequences, thus negating Newtonian reasoning that small forces will create small reactions.

With human behaviour, when organizations near a state of 'self-organized criticality' much greater creativity, innovation and inventiveness is exercised and much greater connectedness and collaboration between members of the organization is evidenced. Complexity theory suggests that, as organisms survive in their environments, many of which might be hostile to such survival, they differentiate themselves increasingly, to find their own survival niche. They self-organize to find this niche; as the environment changes so they have to change in order to find a new, unique niche, and their change instigates a change in the environment, which renders the organism in need of changing, and so on. The process is one of co-evolution (Stewart, 1991), and in this process, there is greater differentiation. To be able to be constantly changing for survival requires immense creativity. As organisms and their environments power up themselves and each other, they move towards greater and greater creativity, self-organization and differentiation; this move is towards the 'edge of chaos' that point beyond linear functioning and before total chaos, where self-organization is very strong. Moving to, and remaining at the edge of chaos is to stand at a critical point – between linearity and chaos; this is 'self-organized criticality'.

In the School, the external agent was facilitating the conditions necessary for moves towards the edge of chaos to be made, releasing the creativity of the staff, increasing their connectivity through communication and collaboration, empowering them to take decisions (self-organization), i.e. creating the *conditions* for creative development.

In the case of the School, could there have been undercurrents which had existed long before the ineffectual English and Chinese Panel Chairs were disposed of? Were their demotions a 'natural' consequence of long-suppressed feelings of dissatisfaction? As for the three English who resigned before the implementation of the development project, had they been feeling increasingly out of touch in their jobs long before the initiation of the development project? Had they not contemplated resigning from their jobs for some time, with the development project only serving as the 'last straw'? Is this phenomenon not unlike the symbiotic microbe in the gut whose intrusion might trigger alarms in other organs in the body?

Complex conditions for change

Insights from complexity theory suggest that for organisms to survive and thrive, favorable conditions for self-organization and emergence need to be created. The external change agent, through various strategies, can promote conditions for complex change. He did not prescribe changes, but, by enhancing communication and free flow of information within the system, and by opening up the system to the challenges of the environment, he laid the ground for changes to

take place in a bottom-up, self-directed manner, i.e. through autopoiesis and self-organization. This relates to self-organized criticality, as introduced above.

Stacey (1992) discusses the implications of complexity theory for management, and argues that in a complex, self-organizing management system, groups and teams of employees will respond to, and tackle, issues by themselves, often over-ruling the teaming that is dictated by the hierarchical structure.

Feedback systems

For a School to self-organize and develop robust institutional health, it must have free flow of information, so that issues can be raised openly and innovative ideas can be generated and addressed by all concerned. Marsick (2000) stresses the importance of feedback and communication in the self-organization process.

At the School, some encouraging signs emerged over the first two years of the project which signified much stronger communication among staff members, especially within the English Department. For example, 'Learning Circles' were formed, with teachers who were teaching the same level working together to tailor learning materials for students and then discuss their effectiveness. As part of the Development Plan initiated by the external consultant, teachers had organized themselves into five teams, each focusing their efforts on improving one aspect of English language teaching. In the 2005-2006 School year, the five areas were: reading, process writing, criterion-referenced assessment, student-centered learning and extra-curricular activities. Every team achieved its goals, and outcomes were reported. A sense of achievement was felt, and the Department re-organized itself into different teams for the 2006-2007 School year.

Two 'spin-offs' from the development team work were interesting. Firstly, since criterion-referenced assessment had been introduced in the School for the first time, as part of the project, new guidelines and procedures for assessment had to be established. One issue involved the subjective marking of student writing. At the prompting of the external consultant, a standardization meeting was held, in which teachers discussed their subjective assessments against 'band descriptors' with other colleagues. The meeting was a success, and turned out to be an honest, professional discussion, which had not happened heretofore.

Secondly, related to the aspect of student-centered learning, the new Panel Chair introduced the practice of peer class observations. Class observations had existed in the past, mainly as part of a top-down procedure for the School management to monitor the work of teachers, and, according to teachers, the only feedback they received was a lukewarm 'not bad'. In the new peer observation system, the focus would be on the effectiveness of the lesson, with a particular slant on student-centeredness. And because of the special nature of peers observing each other, it led to genuine experience sharing and learning. This was so successful that, when the Principal introduced a new appraisal system for the whole School, he included the element of peer class observation in the system, citing the success it had enjoyed in the English Department.

What one can observe happening here is that, as the conditions for self-organization were increasingly promoted, so they because self-potentiating. Just as a young child who is learning to read becomes fired up and reads voraciously, so the early experiences of the staff fired them

into greater development. It followed an exponential progression, i.e. the law of 'increasing returns' (Waldrop, 1992).

Connectivity

Related to feedback systems and communication is the notion of connectivity. Before the intervention of the external consultant, the School had been operating in a rather introspective way. In trying to solve problems, the senior management resorted to control and increased bureaucracy rather than seeking creativity and insights from other stakeholders. When problems remained unsolved, blame was apportioned to teachers, and in turn students, resulting in them retreating into their voiceless cells with various senses and degrees of guilt and defeat. It was a classic case of unfacilitated, balkanized self-organization, with parts of an organism working in isolation and hence not contributing to the whole. The development project began by empowering teachers with free thoughts and ownership. The Learning Circles and Development Teams showed that teachers could initiate and own ideas and successes.

Since the external consultant's appointment to the School Management Committee (SMC), he had been working towards greater connectivity in the School. He initiated a 'retreat' for SMC members, School management, teachers and parents to meet and discuss fundamental issues of the School. It was the first occasion that the four groups of stakeholders had met, and for a common goal, *viz*. to improve the quality of education provided by the School.

The retreat, held in April, 2006, was followed by two meetings with teachers of the School to decide on future goals and initiatives to be pursued by the School. This eventually led to the formation of a School plan that was endorsed at the SMC and School levels, to enhance the connectivity of the elements which made up the School: the students, teachers and management.

Relating to the external environment

Morrison (2002) cites the example of self-organization of the Acrasiales amoebas discussed by Prigogine and Stengers (1985) to illustrate how a lowly organism responds to the environment by reconfiguring itself and metamorphosing in an attempt to survive (self-organized criticality perhaps). This serves as a powerful illustration of how an open system adapts to the environment in order to live. Closed systems in equilibrium, on the other hand, wither and die.

Before the development project, the School was typified by inward-lookingness and not a small amount of self-pity. The management attributed poor examination results to lack of effort by teachers. Teachers took to self-pity and self-blame as they felt they were on the receiving end of poor management and unmotivated students, and regarded their jobs as Sisyphian tasks. Students lived out self-fulfilling prophecies as they were repeatedly told by teachers that they were no good. The whole School seemed shrouded in an unproductive comfort zone of a Band Three School, and seemed to have lost touch with the outside world.

The intrusion of the external consultant in the School aroused attention, which was, at first, not at all comfortable. He was greeted with suspicious indifference on his initial meetings with the English teachers. Non-English teachers, on the other hand, would greet him with dubious smiles. Students, however, warmed to him more readily and welcomed him as a stranger. It was this stranger who managed to facilitate the breaking down of the closed system in equilibrium.

The English Department had been doing things in the way things had been done in the previous twenty years, in terms of pedagogy. Past practice was never challenged, as a result of autocratic management and also for want of ideas. Teachers had not been particularly active in seeking continuous professional development. The development project opened up opportunities for learning, with the external consultant organizing development sessions conducted by guest experts or by himself.

In terms of English learning, both teachers and students seemed trapped on a treadmill of teaching and learning to the examination syllabus, with very little intention to let students learn and use English *in real life*. The idea of a study tour to an English-speaking country was thus conceived, so that students would be afforded the chance to see English in real-life use. Although the process of organizing the study tour was not smooth, with lack of funds presenting the biggest problem, it eventually took place in Australia in January, 2006.

It proved a big success, not only for the 15 students and two teachers who took part, but it also proved the point that all learning had to make sense in the world in which we live. The contact with the outside world, both literally and figuratively, was unprecedented. To the students who took part in the study tour, English came alive as a working language once they arrived in Australia. The activities they attended, in addition to the home-stay arrangement, allowed them to experience a different culture first-hand. When these students shared their experience and insights in a School assembly, they captured the imagination of other students, to whom the horizons suddenly widened. Teachers heard students saying that they wanted to learn English well, so that they could take part in the next tour. For once, students were not learning English to pass examinations.

Co-evolution

Time does not stand still, nor is it reversible; there is an 'arrow of time' (Prigogine and Stengers, 1985). Educational institutions may be sometimes prone to rest on their own laurels and take pride in their traditions, and hence expend much energy in preserving the *status quo* instead of proactively seeking change to keep up with the times.

The last twenty years has seen IT advance in leaps and bounds, one consequence of which is that knowledge is popularized and democratized to an extent that straight impartation of knowledge in the classroom is often seen as unnecessary. Another outcome is that the new generation of students has acquired very different learning habits from those before them.

In Hong Kong, educational reforms have been proposed and undertaken to cater for the changing needs of students in the third millennium. Such reforms involve radical changes in the approaches to teaching, learning and assessment, as well as in the Schooling structure. With specific reference to the English subject, a new assessment mode has been introduced, with two elements included, namely, criterion-referenced assessment and School-based assessment. In the School in question here, with the prompting of the external consultant, much groundwork had been done to prepare students and teachers for such changes. The School had made a conscious effort to co-evolve with the external environment.

Fractals

Another important notion in complexity theory is that of 'fractals'. When tackling the problem of noise on telephone lines, the Belgian geometer Benoit Mandelbrot found that no matter what scale he used, the ratio of noise to noise-free transmissions always remained constant. When he tried to represent the transmissions in geometric forms, he obtained a set of similar forms. Mandelbrot called these forms, which had the property of self-similarity across scales, 'fractals', from the root 'fractus', which means 'broken' or 'to break'.

Brooke-Smith (2003) explains how the notion of 'fractal' can be applied to the study of organizations:

> Institutions can be said to have a fractal nature. Fractal refers to qualities that are 'self-similar'. In the case of organizations this means that systems are holographic or fractal such that the parts interact continually to recreate the whole and the operation of the whole affects the interaction and functioning of the parts. 'Fractal' means that behaviours, patterns, structures and processes will be similar at small group, department, divisional, and whole institutional levels. It is this repetition (and high level of redundancy) of patterned process that is able to give fit and context for mission and vision. Where there is little fractal self-similarity it is harder to create shared aims and goals (Brooke-Smith 2003, 99).

The implications for the School was that 'one-off' changes would likely not invigorate it and bring about long-lasting changes, nor would changes which occurred in one Department. Instead, work had to be done on the core values and beliefs of the staff and students of the School, so that the behaviours of everybody concerned would be in line with such values and beliefs and form a pattern rather than isolated behaviours. Such behaviours would form a pattern and become a way of life of all the stake-holders of the School. In the words of Fullan (2001), the School needed to be *re-cultured*, rather than restructured.

Much evidence has been witnessed since the development project began which augurs well for fractal changes in the School culture. There is much clearer and more open communication between various parties of stakeholders. The views of teachers, students and parents are increasingly sought and taken notice of. As a result, a mutually supportive and trusting culture now exists among stakeholders. Teachers listen to students through the conduct of different activities. The School management is more likely to consult staff on administrative issues. There is much more information flow between the School and the School Management Committee. A fractal culture of open and frank communication at all levels is thus taking shape – between management and teachers, among teachers within a department, between teachers of different departments, between teachers and students, between the School and students.

A learning community is firmly established in the English Department, with individual teachers being given the opportunity to learn at different levels. They learn from colleagues who teach the same levels as themselves, from teachers who are in the same development plan group, and from whole-Panel meetings on pedagogic and assessment issues, in addition to specially

organized workshops given by external experts. They also learn from liaising with colleagues in other Departments over inter-disciplinary issues.

The 'Learning Circles' idea is now being adopted by the Chinese Department in the School. Peer classroom observations are now done throughout the School. Apparently some of the successes initially with the English Department are now generating ripple effects, i.e. ever-reproducing *fractals*.

Epilogue: the immunology analogy revisited

At the beginning of this paper, an analogy is drawn between the immune system of a living organism, for example, a human, and the management system of a School. This paper has outlined how the external consultant managed to enter into the School, just as a pathogen or symbiotic microbe would enter into a human's immune system. The immediate strategies employed by the School management were half-expected, *viz*. they attempted to dispose of the intruder, and failing that, try to limit the extent of the impact. Likewise, the instinctive reaction of the immune system is to achieve immediate removal of the threat. When this fails, there will be down-regulation of immune reaction, and subsequent induction of tolerance.

In the case of the School, the resilience of the external consultant told, and he was there to stay. Over time, he managed to enhance connectivity and communication within the School, and heighten the School's awareness of and relationship with the environment. In similar fashions, the immune system of an organism will respond to new challenges by promoting collaboration between the component systems in the body.

The ultimate goal of the external consultant was to help the School to develop strong capacity for self-organization, so that it would continue to thrive in, and co-evolve with, the ever-changing environment, i.e. to set the conditions for emergent self-organization. Akin to structuration theory (Morrison, 2005), the self-organization advocated in complexity theory and practised in the School was both the medium and the outcome of the development project. In the case of the living organism, it ends up finding and maintaining its immunological balance, and through the process becomes a more robust species.

A final note

One cannot end without a note of caution, or a question. The paper has suggested that several tenets of complexity theory can be, and were, deliberately used in the development project, seeing the setting of conditions for change as being more pressing and ultimately more rewarding than the setting of blueprints and firm detailed targets. Indeed, the project seems to have been highly successful in practice, surely a robust test of many theories.

However, much of the work of the external consultant, reported here, could be simply 'good management', rehearsing the literature on managing effective change from the 1970s through to the 1990s (e.g. Harris *et al*., 1975 and Fullan, 1982 respectively), i.e. predating complexity theory in education. What added value does complexity theory offer, and what does it offer that simply the stand-alone analysis of the management of change could not offer? Put simply, though interesting, did the project and the theoretical premises that underpinned it actually *need* complexity theory? Is it not an attractive, but ultimately disposable theory? Whilst it possesses

strong internal coherence in its constructs, is it not an interesting but unnecessary analytical and planning tool? Is that which is reported here not simply 'good practice', rather than a self-prescription of complexity theory's own importance?

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