Wicked Problems:
Schools and Systemic Change
by
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Managers are not confronted with problems that are independent of each other, but with dynamic situations of complex systems of changing problems that interact with each other. I call such situations messes. Managers do not solve problems, they manage messes.

~ Russell Ackoff (1979)

The debate that follows may never have arisen had it not been for social change. The US has grown hyper-complex in its demographics, ethnic diversity and the social and economic division between haves and have nots. Arguably, the elections of 2008 and 2012 heralded a tipping point of these changes in a land where it is estimated that 25% of Americans today are immigrants or are the children of immigrants.

Were it not for the complex conditions in which schools increasingly operate, the industrial model might never have been considered broken: that is, it could have been somehow fixed or adjusted to suit. However, while school reformers seek to do the right thing and make the broken system appear to work, systems thinkers seek transformation in order to do the right thing. The latter requires so much more than the former and implies a values-driven purpose and a method of getting there. The essence of this debate in part is to shift the balance from reformation to transformation and how this might be achieved.

A truth is emerging and it is one for which we should be grateful. In such complex conditions as those exhibited in the US, the industrial school model fails. It is rendered unfit for purpose. But it doesn't just fail in areas where complexity and social challenge is at its greatest; look closely and it fails at every level even for those schools who judge themselves competent system winners. The simple narrative that all schools can be fixed by improving teaching turns out to be both a lie and a truth at the same time and serves to show that we need to look again at systems and purpose.

This article seeks to focus on the perceived view of the industrial culture of the school rather than what happens in curriculum time; that must wait a while. There is an order to change.

Many call for complete systemic change and understandably so. This article, however, seeks a pregnant pause, a moment's reflection and a last look back. We cannot simply abandon the schools we have and consign them to perdition only to see the same cultural and management processes reinvent themselves later on. To date, schools have defied the deluge of reform aimed at them and yet, hidden deep in their foundations are the important answers needed to design a better school. We must slowly begin to dissolve this wicked problem, and this article and ones following attempt to set out what we can learn from the failure of reform and how to better approach any new systemic beginning.

Readers will note that *failure of reform* is in italics. This is where care is needed. It is very easy to say that teachers have failed to take on board the new ideas and methods given to them by reformers. If only the teachers were more flexible and could see what we see? It is less easy to say that the teachers aren't the problem we make them out to be; that so many reformers have completely failed to understand schools as teaching and learning organisations let alone the consequential outcomes of the changes they advocate. Between these two poles there is probably some common sense. This makes for a messy article.

This article revisits the systemic change debate, reveals the essence of the wicked problem and hints at its resolution. It is all about learning from mistakes but that is the easy bit (isn't it?) for those peering in from the outside able to see and listen and people like me who know the inside, inside-out!

THE SYSTEMIC CHANGE V SCHOOL CHANGE DEBATE

The initial analysis of the school outlined previously teaches us that the organisational structures which schools inherently use tend to disable and distort the means whereby learning relationships between key players (students, parents school staff) form and flourish. The industrial model is all about the teacher and curtails any essential contribution to learning from others in and around the school. This limiter results in organisational obfuscation, waste accumulation, uncertainty (even societal irrelevance) of purpose and blockages to flow and as complexity of input increases the school situation becomes an irresolvable, wicked problem.

The system architecture intended to make schools function actually prevents and undermines the essence of what a learning organisation like a school should be. Rittel and Webber (1973) identified ten characteristics of wicked, seemingly intractable and impossible to resolve, problems. Such problems are information light, contradictory and have changing requirements and circumstances that are often difficult to recognize. Schools as they stand constitute a wicked problem seemingly allergic to any treatment. They have developed a highly resistant biology to any reform, even in those schools we might recognise as good.

Duffy (2008) cites Bar-Yam (2004) who tells us that wicked problems can have no resolution and that any search for one size fits all and best practice solutions will be insufficient. Since schools are inherently based on a one size fits all model, any attempt at resolution does not bode well. Before we abandon schools, however, we should at least explore the nature of systemic change a little more and perhaps seek one final chance at systemic redemption. Without such a pause, full systemic change may simply charge ahead and reinvent what we already have; a system out of kilter with its environment, wasteful of its people and unsure of its purpose.

 In the end, schools and our teachers have a right to understand why change is needed and be party to leading such change; a commonality of transformational methodology which most jurisdictions high in the PISA rankings practised in order to get them where they are! Those engaged in systems thinking want better school outcomes more relevant to the world in which we live and compatible with the C21st challenges we face. That's fine. Systems thinkers also subscribe to the idea that systems should be designed to co-evolve with the environment they serve, what is called ecological systemic change. Frank Duffy (2008) sets out the challenge this way...

> From this point of view, systemic change is based upon a clear understanding of interrelationships and interdependencies within the system of interest and between the system of interest and its external systemic environment. Change leaders subscribing to this view recognize that significant change in one part of their system will require changes in other parts of that system.

Basically, there is an ecological disconnect between what the school system does and what is needed by the bigger system it serves. (None of this is anti basic learning!). So we are talking about improving our schools to meet the evolving knowledge and communications environment while recognising the crucial role of systems thinking theory and practice in guiding any systemic change. The difficult points of contention are what best constitutes transformational systemic change and how to go about making the transition needed to upgrade and reculture school learning in order to shift from one paradigm to another. What does it look like?

The debate hinges on two views; big system change top down and little system change, school up. There is a big system in operation in the US that involves and embraces the totality of schooling across all levels and subsystems. To transform, therefore, the whole system has to somehow change. Such a view is completely understandable and compatible with systems thinking and Francis Duffy sets out a sophisticated and coherent plan to do just that.

The alternative but tarnished view is that transformation should begin at the individual school level despite the litany of failed attempts at reform to date. Without question, schools have failed to change and adapt. Many regard them as broken institutions and feel that it is futile to persist with them. The case for schools leading systemic change, therefore, is weak but needs to be made just one last time but in a different way.

The intention is to show that these two approaches (internally driven, bottom-up systemic change by schools and externally driven systemic change top-down) are actually complementary but that one should precede the other as a first step. In fact, the individual school (system) change should precede big system change and may even precipitate big systemic change rather than the other way round. On the surface, however, it seems that the evidence doesn't really support such a contention. As David Tyack and Larry Cuban (2004) stated when interviewed for Ed., the Harvard Graduate School of Education magazine, ...the school reforms that promise to start from scratch and reinvent education from the bottom up almost always fall flat on their faces.

SO, WHAT EXACTLY IS IT WITH SCHOOLS?

Nevertheless, school-based change is the path which this book explores using the organisational philosophy of systems thinking. It does this even though such an approach appears at first sight to break systems thinking rules by wrongly treating the school as a component part of a wider school system. In systems thinking any concentration on component change is a contradiction in terms and simply causes additional problems to arise elsewhere. However, it is possible to nominate pretty much anything as a system; a school, a tree, a horse, a storm, a galaxy so there is an excuse.

We can tiptoe into this debate. Is it really possible to promote bottom-up school change given its history of reform failure or should we concentrate on a complete and surgical system makeover, top to bottom? First, we need to understand why schools don't work as they should, not just at a context and content level (beyond their remit) but as learning systems in their own right (within their powers) and we need to know if there is anything causal we have missed. This means asking the wicked question, What exactly is it with schools? And then trying to answer the question! What is it that we may have missed that schools can seemingly defy all attempts at transformation and change?

Is it just school management confused by external reformists and their crazy ideas that has gone awry? Wicked problems should at least be dissolvable but to do this we need to know more about what is wrong. This means standing back much further.

This is why any debate among systems thinkers, while interesting, may of itself be a contradiction in terms: how can there be two conflicting approaches each frustrated by the other within an interconnected unifying concept like systems thinking? By re-presenting these ideas it may be possible to show that these two seemingly different approaches to change may be more aligned than is realised and that the re-establishment of systems interconnectivity is achievable!

THE PROBLEM OF REFORM

The background to this debate is complex and ranges freely across boundaries of philosophy, ideology, politics, psychology and so to the current calls for systemic change. Where systems thinkers seem to agree is in the view that schools need to change and be redesigned; their inherent processes and outcomes have passed any

sell-by date and there seems to be no coherent fit either with the families we serve or the society we need and this is especially so in the US. Schools seem to malfunction and break down: bad news proliferates over good and outcomes are so much less in impact than investment warrants as attempts at reform inevitably fail.

No-one is exactly sure what purpose schools serve anymore. They appear to fail as relevant C21st institutions and many are those who seem to have become exasperated by the situation. Larry Cuban (2004) ...For goodness sake, let's stop talking about the financial value of education and talk instead about human capital, about schools helping to create people who are fully developed as human beings and as democratic citizens. Interestingly, Cuban was arguing against the idea of schools being run on business lines and being boot camps for employers. But this is in essence the industrial model. It seems that the purpose of schools is becoming increasingly narrowly focused in a world where knowledge is expanding. Schools are turning in on themselves.

It is all too easy to give up on our schools and our teachers but we are lucky to have them. The fact is our schools are full of amazing people but despite all the effort, research and support given, schools seem to be robustly immune to organisational change. Given many of the changes advocated this might not, of course, be all bad! Nevertheless, they remain astonishingly resilient and seemingly obstinate.

We hope, for example, that new prosocial education programmes will change risk-taking behaviour, reduce drug abuse, STDs, unwanted pregnancies, violent behaviour and create better citizens and a more caring society. We hope that new literacy policies will improve reading and that new approaches to mathematics will improve the ability to do sums and that blocking timetable time or changing this or that will provide the fix needed. When schools fail to deliver on the new policy, the different methodology or the new way forward, trust starts to evaporate and in no time at all the focus of blame falls on the school and the capability of the classroom teacher; despair!

This, in turn, sets up a debilitating reaction of passive dependency as the school freezes and reverts to its factory production ways which is all it has, knows and understands; this is, after all, the school's unchanging, management inheritance. Schools do the job we ask them to do and we then complain when they try to do that job! Schools aren't the products of accident but of poor and outdated design and an inability to evolve. They have too often been burnt but they can be redesigned if we know how; they cannot be fixed by fiddling around, something Deming (1994) called tampering Cuban and Tyack (1995) call tinkering.

School reform has been a hot topic ever since schools began, The weight of years sometimes causes us to baulk at the challenge of school improvement to the extent that there is now a deep suspicion regarding the very idea of the ability of reforms to rectify perceived faults let alone change management behaviours, leadership styles and teaching and learning cultures. Too many reforms seem to fail and some turn out not to be reforms at all but merely patches used to keep a broken system going a while longer.

As ever, the old systems thinking mantra is restated again and again: adding new parts to old simply causes breakdowns elsewhere; repeat fifty times! It seems that the institutions we have are unable to access and use the systems knowledge needed to act on their system, and leverage transformational change; this means that the systems thinking analysis and design process is unable to do its re-culturing job.

The process of checking the system, gaining knowledge and then applying that knowledge to act on the system to redesign it is largely absent, misunderstood and misconceived by school reformers. Reformers use patches confusing them with changes. The problem is that we are using industrial tools to fix industrial organisations and this merely keeps the machine chugging along in the same direction. Paradoxically, this actually makes reform part of the reform problem, just as the manager has become part of the flow problem. The tools we have are system repair tools not system design tools but this what we are seemingly locked into.

Schools cannot analyse their systems from where they stand and neither, it seems, can anyone else so we keep trying to fix the bits we think we know, usually teachers and curricular programmes by applying (in part) business applications that have proved all too fallible. Any single-loop industrial approach to a double-loop organisational problem inevitably creates a severe systems blockage to flow at a fundamental systems level. Anyone who has experienced one of these flow problems will understand that these can be obstinate and painful to remove! Even so, removed they can be! We simply need to take another last look through the systems thinking microscope and diagnose the probable cause.

THE GHOST IN THE MACHINE

As things stand, the received message is clear; reforms don't change schools, per se. But does that mean schools are a hopeless case, a wicked problem and an amalgam of messes; irresolvable?

Larry Cuban and David Tyack (1995) describe this challenge in their book, Tinkering to Utopia which charts the failure of reform to impact on the US education system. For the authors, the purpose of schools has consequently narrowed and is no longer that which it is educationally and culturally claimed to be: it seems that schools exist to supply the sufficient number of bright people needed to remain nationally competitive. This results in a washback effect whereby educational success is seen as a product of passing tests at the expense of deep learning while at the same time being willing to discount the many for the few, as waste. It is a system in which everyone ultimately fails, even the winners.

Underpinning this is a school production line that is out of synch with today's world. But in our desire to compete in the international paranoia PISA race with the likes of high academic performers like Finland and Canada, the country's best means seem disabled; we are unable to use our greatest attributes, our amazing teachers and our system thinking creativity. This is not only frustrating, it is incredibly annoying for a country like

the US, able to roll out hundreds of Nobel Prize- winning problem solvers: some 39% of the total and 48% of all the sciences.

It seems ironic to ask schools to produce problem solvers if schools themselves are a problem that needs solving. The fact is we end up turning out too many people who are insufficiently equipped, less open to learning and more dependent on the state to get by; not to mention the million who decide to drop-out annually! None of this is the direct fault of teachers but it is the place we are in. For Larry Cuban (1994) in a conversation with Ed., our teachers have already become the soldiers of reform rather than the agents of reform. The standards movement that drenches the US system in a regime of testing banality treats all schools and all students as being the same despite their inherent diversity. So, where to go? Simply shoving increasing diversity in at one end and trying to output conformity at the other doesn't seem to be the best systems thinking approach to managing hyper-complexity.

SCHOOL BASED REFORM

For John Goodlad, reform seems to be merely déjà vu despite his long held belief in the school as a self-directing, agent for change. In 1984 he produced his seminal book, A Place Called School, drawn from a major US research project. For Goodlad, the classroom is a place where time is the most precious resource. Teachers both condition and are conditioned by the circumstances of schools... In school, it is time not talent that determines and creates inequities in any opportunity to learn. In school ...the clock is king... not the customer.

> ...A student sees five or six teachers per day and is known a little bit by a number of people, each of whom sees him in one specialized situation. ..Save in extracurricular or coaching situations ...there is little opportunity for sustained conversation between student and teacher.

Note these simple words with care; they are all too easy to dismiss in our desire for change. Their deep importance will become clear. For our industrial model, the use of time is of considerable importance. Not to use it is to waste it: time must be filled; time is money! This means that for change to occur, time needs to be revisited and bent just as Einstein said!

For John Goodlad (2010) school is the right place for any transformation to start. He describes the essence of the school in terms of time plus learning relationships and throws all he can at the improvement problem; schools are precious and each has its own particular ethos. His description of the broken and patchy learning relationship between teachers and students is key to schools as organisations and to systemic change. All we need to know is why this is and then (the difficult bit) how to cultivate these relationships back to health in a way that not only enhances deeper learning and better teaching but leads to systemic change.

There is a systems conflict and there seems to be no basic organisational fit or systems understanding to address the matter. Goodlad knows we need schools that are constantly self-renewing rather than self-repeating. His vision is for schools to be able to achieve such renewal despite all the evidence, experience and research to the contrary. Reformers see the symptoms but not the cause while in the background time appears to be yet another immovable constraint, ticking away.

Sometimes, we don't spot what is in front of our eyes. Sometimes things are so deeply established and there for so long that they have become an assumed part of our thinking. We end up looking at time or the teacher as the cause but the teacher is another victim of the crime not the perpetrator. Poor (ill-trained) managers always look to blame people for system faults; they are sadly so much better at managing people who need little management in good systems, rather than the broken systems in which people work that do.

This theme raised by Goodlad, of the seeming abandonment of any real learning relationships and interventions between adults and young people in our schools, is one to which this book constantly returns. We must organisationally heed psychological needs or suffer the consequences as the tragedy in Columbine and Sandy Hook showed. How can it be that busy and bustling schools alive with humanity can produce resentful loners? Goodlad is right to call attention to the importance of the quality of learning relationships. Inadequate learning relationships are not just a symptom of system breakdown but part of the root cause. They were never designed in to the industrial model; they were not seen as necessary, but they are necessary now!

There are many clues from the past, but most have been seen as warranting only superficial interventions and policy changes. Social networking, the media, poverty and ingroup loyalty are all powerful influences on the learner. Even further back, the Coleman study of 1966 concluded that the main influence on academic performance lay in the environment of the family and in peer groups rather than school (another clue). Unfortunately, in seeking out the school characteristics most likely to lead to better outcomes, we end up on the same dead-end route used to identify leadership characteristics; a long list of traits from which to pick: a shot in the dark, ten things every leader should know!

Somehow, systems thinking must be able to dissolve and re-culture a wicked design flaw involving time, learning and people and how these might better connect to form a more relevant operational learning process. It seems that what our schools are best at is resisting change and staying the same. But teachers don't mind change; why should they, they have never seen any! If all of this is the complicated gist of the problem what is the design remedy? Is it little school or big system, or perhaps another look at the nature of the interconnectivity that joins them?

The case for school systemic change (inside out) seems to be a hopeless case and most system designers have packed their bags and gone home on this one. Except that is for the one fatal design flaw, the one that no-one talks about because it is there all of the

time, built in during an industrial age, untouched by reform, immovable, the one we don't see because it's too close. I discuss this fatal design flaw in detail in my new book (The System Thinking School, Rowman & Littlefield Education, Leading Systemic School Improvement Series).

THE CASE FOR BIG SYSTEMIC CHANGE

The case for systemic change is topical at this time because it is again catching the imagination of educationists and governments, always an oddly reforming couple. PISA paranoia rules and distorts reformist thinking. The case for systemic change follows an all too familiar logic focussing on schools and their role in society. The reason schools don't work is because they don't teach the right learning things in the right way; they are simply out of date on all fronts, way behind the learning curve. One size fits all can never be right. Tests aren't a true test of schools. Oh! And teacher quality is too low; it is a coin toss whether to sack them, back them or pay them more! Best to start again.

We overlook the question as to why this might be and assume it is largely a content issue for the curriculum or a problem with context, perhaps social fragmentation, a training matter or pay issue for teachers. System reformists worry about these matters. They are adamant on one thing; that whatever they come up with, any new paradigm should not resemble or reinvent the schools we have! Given that many have a good feel for a new paradigm, the problems remain; a) how best to make the new paradigm shift and b) how to avoid reinvention of the status quo given our failure to analyse even the most fundamental flaws in the current system.

Our schools still act as a crude sorting process while learning is restricted by time and measured as the product of testing (low order thinking and learning) rather than as a process of human development (higher order thinking or deep learning). We have a high waste system with an incompatible ecological fit. These features were set out in Chaos, Culture and Third Millennium Schools (2000) and such taxonomies litter the organisational literature of business excellence (Peters, Senge, Druker, Belbin, Kanter and more).

Our schools evolved to cater for the mass production and assembly line techniques of an industrial age characterised by high command and control thinking, bureaucracy, standardisation and compliance with specifications. They are still moving in this errant direction and many more erratically so because of reform confusion and there can be only one reason. The system must contain within it a deep and fundamental flaw that prevents adaptation and which has avoided all of our system checks. We note all the many output distortions, the waste of a nation's potential, but not the common flaw, the common cause variation issue.

Schools have been simply unable to adapt and evolve to form a new paradigm that is better able to meet the Information Age requirements of teamwork, flexible problem solving, initiative and so forth. These require a substantively different and more qualitative approach to learning and teaching. One might almost describe this desired

change as developing a systems thinking mind, one that thrives on the interconnectivity of learning and on the dependency of a range of learning relationships and sources; an active as well as a passive learning system. This appears to require a very different back-up systems approach to how schools might go about their tasks. To manage complexity, schools have to be more sophisticated not simpler but how?

PIECEMEAL CHANGE

Francis Duffy is rightly concerned about what he calls piecemeal change and especially when it purports to masquerade as systemic change. So he asks this question: When is systemic change not systemic? He provides an excellent guided tour of the area. Systemic change can be applied as a term to all sorts of situations and levels of organisation from a single school, to a district or local authority to a State. Within and even across these administrative levels and jurisdictions attempts at change almost inevitably disappoint as hoped-for reforms fade, and fail to embed. Such an approach seems to make little sense. But the bottom-up model school by school, also fails; as Francis Duffy (2008) says,

> ...transforming a single school (or program) makes that school incompatible with its system. When a "changed part" is incompatible with its system the unchanged parts of the system will strive to overwhelm it and force it to revert back to its pre-change status.

It is a bit like peer group pressure and ingroup loyalty. This presents quite a challenge to those who still hold out hope that schools can and must transform as individual organisations in order to create the conditions for any new paradigm to start. Schools have to reach a stage where those who work in them can see the changes needed and have the courage and systems knowledge to plot a better course. They need systems thinking support not abandonment.

Using Ackoff's eight defining characteristics for system change, Duffy answers his own question: systemic change is not systemic ...when it focuses on anything less than the whole system. This raises another question. Is there any point in writing a book called, The Systems Thinking School? Well, yes. Persuading a school to adopt a systems thinking philosophy may yet hold some hope for a successful systemic change process. Better to have schools on-side than reverting to the trials and tribulations of the status quo. Duffy's argument continues. Basically such piecemeal change at school level is not only insufficient for big systemic transformation but it ignores Ackoff's eight principles of systems thinking as applied to schooling.

Duffy realises that the current industrial paradigm in use is unable to deliver what is needed... we need whole new school systems that are totally aligned with the needs and requirements of the Information-Age in 21st Century America. Duffy sets out the criteria for what this means using the four transformational descriptors provided by Eckel, Hill and Green (1998); he then adds two more criteria of his own.

Thus transformational system change...

1. alters the culture of the system by changing select underlying assumptions and institutional behaviours, processes, and products;
2. is deep and pervasive, affecting the whole system;
3. is intentional; and
4. occurs over time;

Now apply Francis Duffy's two important additions...

5. creates a system that continuously seeks an idealized future for itself; and
6. creates a future system that is substantially different to the current system; that is, the system must be transformed to perform within a different paradigm.

Duffy is adamant that the John Goodlad view of the school or partnership of schools as the change unit as set out in A Place Called School, has been tried and found wanting. It is piecemeal and piecemeal doesn't do it! The rest of Francis Duffy's 2008 article is astonishing in its breadth of imagination setting out as it does how such a mammoth task of systemic change might be best approached.

MOVING FROM WHAT WE HAVE TO WHAT WE NEED

It may seem impossible to write this book given that it appears to belong to that category potentially and understandably filed under piecemeal change. However, it seems that systems thinking at school level has followed a route into a mess confusing cause and effect. It has failed to explain adequately why reforms fail and this is why we need to look anew at our schools. As Duffy says, unless we can explain this phenomenon to our teachers, schools will find any systemic change difficult to accept to say the least. The last thing rational systems thinkers need is to be labelled as failed reformers.

This is not what systems thinking should do (make change difficult). But when we look at how systems thinking is beginning to be applied in schools it is clear that it is in danger of becoming bogged down by the very complexity, albeit parallel, that it is supposed to illuminate and simplify. Much is being applied with success to the classroom but it is the organisation of which the classroom is part that needs systems thinking attention. Systems thinking is not meant to merely make a broken system work better; it is there to see through complexity and redesign the system in play to manage complexity that improves relevant output.

Further clues to the nature of the fundamental operational flaws inherent in schools are provided via SIGGs, (set theory, graph theory, information theory and general systems theory) the educational systems model devised by Maccia and Maccia (1966) and to the 201 hypotheses outlined there, but to two in particular.

66. If educational system centrality increases, then passive dependence increases.
67. If educational system centrality increases, then active dependence decreases.

Please just keep these system hypotheses in mind for a while. It is appreciated that when read for the first they can cause a severe headache but an explanation will follow!

To help us, Kira King and Theodore Frick (1999) can guide us through, drawing on their paper, Systems Thinking: The Key to Educational Redesign. Again, a picture is painted of a school system out of synch with the demands of an information age and the coming of what Thornburg (1995) called the Communications Age.

Schools must help children become skilful manipulators, synthesizers and creators of knowledge. And since we are now entering an era of global communication and collaboration, we need professionals who can work on teams to solve complex problems. Society no longer relies primarily on factory workers, but on lifelong learners who can think critically, solve problems and work collaboratively.

While we have a good idea of the demand side of schools and of the need for redesign, we are still faced with the old issue of reform failure;

> ...reform efforts fail because we lack the abilities required for systemic design; we cannot analyze the existing school model holistically and recreate it from the ground up. Instead, we often remain entrenched in our current notions of education and only tinker at the edges of schools, making minimal changes. With the grandest of ideals, designers often aim towards creating a new school that looks totally different from traditional education, only to find that the resulting system is very similar to a traditional classroom!

The wicked problem! This shouldn't be a surprise; stick a teacher in a room with a learner and you end up with a classroom but we understand what is being said. Again, it seems that the case is lost for the school as the critical agent for systemic change. But in this rhetoric is a further clue; our inability to analyse the existing school model. Why is this so in an information age of problem solving? It can only mean that we are looking in the wrong place at the wrong system features, allowing the purity of systems thinking to be obfuscated by component parts that distort our own system thinking approach to complex problems. This needs a closer look. As I stated above and repeat here:

> Goodlad saw the symptoms but not the cause. Sometimes, you don't spot what is in front of your eyes because it so deeply established and has been there for so long it has become an assumed part of thinking. We keep looking at time and the teacher but the teacher is another victim of the crime not the perpetrator. Time doesn't bend and we keep trying to repair symptoms not causes. Symptoms are the distorted superficial descriptors of component parts (teachers and programmes, leaders and managers).

The other clue provided by King and Frick that seems to occupy those who want radical change is the system's extraordinary ability to defy reform and to keep recreating the traditional classroom. We tend to see reforms as failing in their purpose because they seem unable to break through the entrenched circularity and powerful orthodoxy of compliance and management thinking that simply persists and persists and keeps reinventing its original form. It is an international phenomenon. Schools cannot kick their old people-management habit in part because it is all we have given them. They seem invariably, to navigate back to the safety of some out of synch homeostasis of the industrial age.

King and Frick take us to two more vital ideas that are essential to any understanding of schools, systems thinking and school improvement. They use Steiner's work (1988) which describes an educational system as consisting of teachers, students, content and context; these form the basis for learning relationships (what Elizabeth Steiner calls affect relationships) and how a school operates as a learning system; a system is described by Steiner as a group with at least one affect relationship which has information; thus a school is a system that builds and defines affect relationships.

These relationships are powerful but when examined simplistically (without psychology) they tend to justify the current industrial model (Frick 1991, 1993). They tend to recreate what we already have, the status quo, and this is especially so when testing rather than learning defines the content and the affect relationship. This same contextual problem tends to undermine any ability to intervene rapidly in learning behaviour because of time delays.

Because, however, the teacher is part of an affect relationship with a student, the teacher cannot be regarded as a component somehow separated out. It literally takes two to tango! From a systems thinking perspective, any focus on the teacher alone is unlikely to result in the changes desired. We have to look further-back and closer-up all at the same time.

Now we add another force, the central powerhouse of command and control thinking behind the compliance structure which takes control from those who need it, to service those who don't. According to the SIGGS hypotheses (above), when centralisation is high, active dependence is low: here active dependence is the power of those in and around schools to influence others, to have some control over and actively seek out sources of learning. In effect this hypothesis describes a situation where we don't have to depend on our own human resources or on anyone; it is all (content and context) provided i.e., programmes, time slots, policies, regulations, tests, etc. including claimed reforms and innovations. Some call this spoon-feeding.

The adjacent hypothesis of the 201 hypotheses offered, confirms this: when centralism is high passive dependence is high. It seems that any external controlling influence whether command driven or ideological or both, has an adverse effect on the school's ability to function by limiting the independence of the school's systems thinking process.

In short we appear to have what Ackoff called a mess! Our school managers manage messes. It is such a mess that it defies analysis and simply keeps replicating itself back to its default industrial state. But even though schools are comprised of messes we still need to analyse them somehow and understand even more about what is happening and why these hypotheses seem to be so powerful. So let's try a different approach, a slant on the systemic argument.

THE BASIC DEFAULT SCHOOL OF LEARNING

Francis Duffy is right to say that unless we can show good people what is wrong and that what they are doing is based on management assumptions that no longer hold, they will not and cannot change. As prisoners of the past, they can neither unlearn nor let go, so any arguments need to be persuasive.

BACK TO BASICS

If a school is essentially, as Steiner, Maccia & Maccia, and King and Frick suggest, an interconnectedness of learning relationships, care must be taken that no assumptions are built into this notional commonality of thought. Any systems thinking approach must not be complicated by dependency issues that are themselves built-in and seemingly beyond the school's reach. This includes context and content. In fact, merely changing what is taught (content) is a bit like filling up with a new grade of petrol/gas. The engine remains the same and probably doesn't run any better. Costs increase. Somehow learning relationships, managing operational complexity and time have to change, to work as one. There has to be a new school and organisational coherence.

There appear to be built-in assumptions with regard to our acceptance of how schools are viewed as learning organisations and that there is a particular problem with US schools (highly complex social conditions). To analyse and understand the basic interconnectedness of a school means we should discount the things a school cannot yet control, especially the content and some of the contextual conditions in play. They can wait in the reform inbox. We must deal first with the basic system relationships and management behaviours that schools can change given a little unlearning and a little application of systems thinking.

Let us imagine as systems thinking encourages us to do, that the basic unit, school or education system is much simpler.

It seems to be that the basic learning default of a child is systems thinking. The child actively seeks out and makes interconnections in order to understand its environment, and in this respect is dependent on forging learning relationships (active dependence). Over time the formal school system repackages learning robbing the child of their natural openness to learning and their active learning abilities by downgrading their intellectual inheritance and their potential in order to suit apparent time restraints or romantic ideals. We so easily mess-up the learning environment and the nature/nurture balance.

The basic first learning phase is actually a child and her parent (an affect relationship). The context is one of nature and nurture, and learning content is very basic and defined entirely by need. The school is the second basic phase; a child, a teacher and the parent. The school and home must not be separated (and industrialised) as they are now. To do so is a fatal system thinking and learning flaw. How can learning possibly work without the complete and joined up information of those most knowledgeable of a child? So learning is not separated but depends on the successful interaction and interconnectedness between these main players.

This early years' work is intense. Any separation of responsibility for learning breaks systems thinking rules. When we moved from the country to the city we industrialised learning and made it separate. We broke the systems rule and now we are paying the price. As our little school expands, other students join in and the basic system starts to grow so let's not spoil it all by adding content and too much context at this time. The critical part of the school, (the bit we broke) is the interconnectedness between the school's participant players, our understanding of how adults and children learn from each other.

To understand this we have to appreciate what has happened to our main players. What is it about the industrial model that has caused so much to go wrong, the damage, the system weakness, the disconnectedness and the inability to evolve?

Think of this like the big bang theory or quantum mechanics. In the very beginning were the parent and child and over time a teacher came along to help out. Later another, older kid turned up and from all of this matter and chaos, the learning universe began to form. We have our basic human system elements. This is the school. All are concerned that the child grows into a better version of themselves, that the child understands the world and can make things better not worse: it is in their interests and the child's to survive and to learn and thrive using what knowledge we have, what is important and of value: the value work, to increase good.

In the beginning everyone was a teacher and learner; schools must first ensure they still are. Of course this was all before we rented out our kids to the state and sacrificed our dependence on each other (child/teacher/parent) and created a 'me' culture of separation. We need to avoid this wasteful, alienating route! In the end having great learning relationships at school is far better for our kids than creating schools that turn out people that might eventually need a shrink or drug- dealer on speed-dial to compensate for their inability to learn and socialise.

What our little school system really needs to understand is how the adults and the older kid who turned up later and made us think of the idea of a school, can best function and learn; how all can work together to support and contribute to the successful growth and development of each other. Many schools actually operate in this reasonably untainted, purposeful, values driven and systems thinking way, where primacy is given to a

unification of what it is to learn and what is needed to grow and develop into a great person: our dependence on each other rather than our separation.

When we consider the school in its infant form we can see what matters, what makes it actively dependent and what makes it strong enough to ward off compliance and decide on strategies for its own ongoing improvement. In effect, this is the essence of any systems thinking school and exactly the criteria Francis Duffy set out in his adapted six point plan for the adaptive school.

THE FUNDAMENTAL FLAW AT THE ORGANISATIONAL HEART OF THE SCHOOL

So what was it, staring us in the face that messed up our schools, broke human learning relationships and made schools too obstinate to change? It was obvious all along, we just didn't see it and because we didn't see it we fed it with reforms and it grew even more obstinate distortions of itself. It is this.

The horizontal or year or grade system of organisation which defines the industrial model cannot flex sufficiently as an operational learning system to build the kind of learning relationships and processes to which all concerned parties need to interconnect and contribute.

When systems thinking is applied to the huge assumptions relating to an industrial school model based on linear, peer or same-age production principles, it reveals an organisation handicapped by time and severely restricted by management and leadership frailties and system output distortions. Such linear models can never build the inter-connective double feedback loops that enable flow and bend time to enable learning.

The result of this common cause variation allows output distortions to expand. Over time, school industrialization does the complete opposite of what is needed: it becomes more adept at narrowing its focus, packaging knowledge into spoon-fed lumps, sifting out faulty students for retreatment and repair as so much waste and cleverly expanding a massive job-creation enterprise at enormous expense. The result is mass delusion and an increase in unnecessary complexity loaded on top of existing complexity.

In our linear model, we have made completely ignored the psychology of child development, of Huizinga's Homo Ludens written way back in 1938 and the many subsequent contributors, while ignoring the other basic building block of organisations, customer care. The school has developed an unmanageable management system whereby the totality of its enterprise and learning relationships has been dumped on the teacher in the classroom. We have endorsed the idea of teacher fault rather than system fault. We continue in Ackoff's words, to do the wrong things wronger until, eventually, a wicked problem is created.

The linear model distorts and undermines every organisational and operational aspect of learning and teaching but is the only model we know. Such linear systems can never do

the value work needed and are dependent entirely on teacher brilliance. It is technology at work again, making a science out of an art, confusing special cause and common cause variation, using single-loop thinking to handle double-loop complexities and creating so much unnecessary waste. It is this linear model that has stuck around unnoticed and which has maintained the errant behaviours and assumptions that no longer work which stand full-square between schools and the Information Age.

What has been built is a single-loop, isolated information system in school rebounding around classroom walls and unable to escape. We have got knowledge surrounded, pinned down, bottled up and force-fed to inmates reliant entirely on externally misguided programmers and disillusioned teachers when a multi-nodal information and learning feedback process is needed. We aspire to exams and tests rather than to creativity, wisdom and any understanding of real values. We inadvertently teach our kids to trash the place in their anger rather than to cherish and learn.

The subsequent breakdown of interconnectivity is why our schools are permanently in the grip of hypotheses 66 and 67. It is why intervention and reform fails and it is why learning is at risk for children no longer recognised for their uniqueness and the talents they all have; it is why schools are stuck and reforms fail. We have simply lost common sense.

THE ANSWER

Escaping this closed wicked problem is simple: all it requires is an understanding of how the magician creates this illusion (the reveal) and why we so easily fall for the trick (the illusion). All that is needed is for the systems thinking school to learn how to change its learning relationships, re-establish information and communication flow and for people to get back in touch with who they are and to what is important, the stuff inadvertently taken away: and then everything else. The rest of this book explains the why and the how.

What systems thinking must do is not reject the school too readily as a piecemeal player beyond repair but show our schools how schoolteachers, parents and children became isolated from each other and to explain why these strained learning relationships have endured in organisational terms. The industrial design was teacher-centred and learning relationships were never interconnected at any substantive level because there was no need.

Today, that basic model and its accompanying management thinking are even more deeply rooted leaving the teacher to bear the totality of the system load, a return to the default position. In societies as hyper-complex as that of the USA, such a teacher dependent system is unable to adapt or evolve; the wrong reforms have been applied to the wrong problem and this persists. In effect, the teacher is set-up to fail.

So we know what we never saw, the entity that resists, and the design flaw that systems thinking has revealed; the linear production line. This is the horizontal year-system, the conveyor belt, the ticking clock, the management and leadership of nonsenses, the

broken learning relationships, the separation of school and family, the garbage of grades, people all working to the targets and the tests, all disconnected within a small system and from the bigger ecological system, all without purpose: all good people trying to make a broken system work despite the odds and a world crashing around them.

It was there all the time in the architecture of the industrial age: they built things well then, to last! The horizontal structure or grade/year systems can never properly support an effective operational learning process no matter how managers and leaders try and adapt it. Outcome distortions will always arise. Such a system prevents critical and fundamental learning relationships from forming despite what schools assume and despite schools thinking that their learning relationships are OK. The school has to understand why this is and how they were led into continuing industrial mechanistic management systems based on false ideas and assumptions about people, time and learning, and then subsequently judged on their ability to comply rather than their ability to facilitate deep learning.

Our systems thinking, analytical focus has been wrongly shifted to the classroom, to programmes, to romanticised reforms and to leadership (component thinking) wherever we wrongly perceived the damage to be. The fault is structural not human in essence but the fault has damaged everyone all the same. But this means it can be put right, not fixed; redesigned. If the system can be redesigned, people can do the value work and think about purpose beyond the leaning tower of PISA.

DISSOLVING THE WICKED PROBLEM

This should be fairly simple to rectify now that schools are increasingly encouraged to act more independently of governments. Schools have to relearn the art and the values of self-organisation, described by Donella Meadows (2009) as ...the ability to structure themselves, to create new structure, to learn, diversify and complexify. As centrality decreases, surely passive dependence should reduce.

We must, before any large scale systemic change, get the learning relationships in and around our schools understood, relearned and restored and interconnectivity re-established. We have to get the psychology right and be able to recognise every child as a learner. This can all be done by one simple change, a first domino of a domino effect. Instead of same-age students populating homeroom time, students of mixed-ages are formed (vertical tutoring) and these meet once a day for 20 minutes and this book and my previous one simply explain why this is so and how such a small change reunites schools with their true values and updated management principles.

This may sound extraordinary and too simplistic, but this is the beginning of reculturing a school and redesigning its operational learning process. Such a domino changes everything quickly and permanently when understood. If we fail as systems thinkers to support schools to do this, we take the risk that any ensuing systems thinking paradigm will be misunderstood and applied in old ways.

The linear model must become vertical. But more than this; creating schools that can systems think is a surer means to build any new paradigm. Such schools operate by establishing the values that ensure adaptive continuity and substantive and lasting learning relationships in tutor/home group time and with parents; this is a potential 60% organisational increase in effective learning and support. We simply build a new system that supports the totality of the operational learning process rather than rely solely on the isolation of the classroom, one that reunites all key players. Mixed-age homeroom time is the start of abandoning a linear teaching school for a teaching and learning collegiality capable of returning to our kids their systems thinking inheritance.

This small change may sound simplistic, but it is extremely challenging and requires preparation. A century of industrial thinking does not easily fold and requires considerable unlearning and re-learning at management and leadership level: but it is well within a school's compass for those willing. Again, the rest of this book explains how VT works to improve outcomes and how every facet of school changes.

It is precisely in the wreckage of disconnected learning relationships that separation of school from home and separation within school itself has weakened schools, caused them to be compliant and stopped them from being the schools that we need them to be. We need our schools to be self-reforming as far as possible, reforms not added-on but a reforming and improving risk nature built in. Francis Duffy calls this (Item 5 above) a system that continuously seeks an idealized future for itself; a system where quality and change are integral not added on. Only by getting the school's working relationships right, ensuring dependency on each other is understood and working can we make the school's value work, work better.

AND FINALLY, MR, GOODLAD AND MR. DUFFY ARE BOTH RIGHT

It is not the purpose of systems thinking to make a broken system work better when fundamental redesign is needed. We can analyse schools very easily when we see them through a systems thinking lens as places where everyone, not just the isolated teacher and child, is engaged in building highly active learning relationships. All we need do is make the intellectual separation between what is needed (a system to re-establish learning relationships) and all the management dross schools have been persuaded to garner over the years. This is the fundamental and most powerful thing systems thinking can do to effect system change. The rest of the cosmos can wait a while.

This book simply shows how learning relationships are formed and why and how schools can use them with astonishing effect. There are now many hundreds of such secondary schools worldwide trying to do just this.

It seems logical that given the validity of the SIGGS hypotheses, systems thinking should recognise what may be happening when an external and mainly top-down reform system collides with a school system made high on passive dependence and low on active dependence. The answer is a combination of confusion, an inability to act or nothing at all. Reform fails and school management remains stuck. To be enacted and embedded

successfully reform requires the knowledge acquired through high active dependence and low passive dependence, the opposite to what we have.

And there is the reform paradox. Once the reforming centre retreats the school becomes largely self-reforming ...with help.

Having...

- damaged the school as an organisation with regard to its independent thinking mechanism
- separated it from its values
- undermined its ability to build, maintain and understand learning relationships
- consequently substituted and transferred what's left to the content and context dumping ground and isolation of the child's and teacher's classroom
- designed leadership and management programmes to run the same broken system ...and
- misapplied accountability and appraisal type mechanisms to suit
- ...we are left with the distorted consequences of a centralised industrial architecture, horizontally handicapped, where reforms so easily hinder and spell failure.

The root problem is very simple. The horizontal organisational arrangements of schools using year systems and grade systems, act to prevent the essential interconnective learning relationships between school, home and child from forming and this inhibits the child's full and deeper learning capabilities. The linear model prevents learning as a complete operational process by breaking the school's essential communications linkage, learning support and assessment methods. Both the parental role and the home tutor role have been effectively sidelined as pertinent contributors to the learning process and this in turn jeopardises the learner, the teacher and the family.

We continue to sift and grade rather than listen and learn. Our students are no longer people but walking sets of numbers and grades, in a system largely devoid of personalisation. This is also the architecture that acts as a limiter on content and context and on the transfer from extrinsically driven studenthood to intrinsically driven learning. It is also the limiter behind what in SIGGS is called homomorphia, the idea that there are many different learning pathways and many different talents that can be used and developed to achieve educational goals. The problem is essentially a structural fault not a human one. We have succeeded in creating a system whereby everyone ends up doing the wrong job wronger.

The change to vertical groupings for a short time each day is the start of a healing process. It is what such a small change precipitates that is truly life enhancing and school changing.

Thankfully, Frank Duffy also set out the pathways to change ...The literature on transformational change repeatedly reinforces the need for people in organizations to change the way they think and act along three change paths

- Path 1–transform their system's core and support work processes;
- Path 2–transform their system's internal social infrastructure (which includes organization culture, the organizational mental model, organization design, job descriptions, reward system, and so on); and,
- Path 3–transform the system's relationship with its external environment.

This small structural change does what Goodlad wishes for and starts what Duffy demands. A short pause in the day when schools reforge their interconnectivity creates time to ensure everyone is known. This makes school possible and allows the classroom to be whatever it needs to be. It also returns the child's tutor to being the person that the teacher, child and parents need him and her to be. It allows the double- loop interconnectivity to develop and guide learning; the same double-loops absent by design from horizontal structures.

With guidance, the introduction of mixed-age or Vertical Tutoring for a short time each day sets a school on these three pathways (above) immediately and permanently. The essential organisational shift that VT demands is to switch from being a back office bureaucracy to a front office service organisation: all core work processes and support mechanisms have to be re-geared to the new arrangements. Culture changes as soon as the unlearning penny drops; it is instant, in the first minute of the first human interaction, when a tutor meets a child for the first time in their time.

My newest book (referenced earlier) sets out how this is done and at no cost! VT can go a long way down Path 3 above. It cannot change all of the compliance practices but it can secure for those who work in schools a systems thinking mindset and learning relationship interconnectedness that enables better learning and teaching; a system more able to intervene, support and enhance learning, to heal and make a difference. When the school gets stronger it too can adapt the original SIGGs hypotheses and take back the power to innovate that the centre doesn't really want or need. It can journey along the third pathway and inspire systemic change.

If educational system centrality decreases, then passive dependence decreases.

If educational system centrality decreases, then active dependence increases.
When passive dependence decreases and active dependence increases, the centre will let go because parents will demand that their kids' teachers be left alone to do the value work and build the new paradigm they and their kids deserve. Teachers/ tutors/parents/ children all interconnected in learning relationships and part of an interdependent and ecological learning process. Duffy has set out not just the pathways to systemic change but to systemic wisdom and that is a spiritual route worth travelling. Ask Robert Persig!

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23

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Thank you for your interest in these Reports.

Francis M. Duffy

THE F.M. D UFFY
G R O U P

The Rowman & Littlefield Education *Leading Systemic School Improvement Series* is a collection of books about "why" systemic change in school districts is needed, "what" some of the desirable outcomes of systemic change should be, and "how" to create and sustain systemic change. You can visit the website for the series by going to https://rowman.com/Action/SERIES/RLE/LSI

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