Editorial

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Given that many teachers in South Africa lack content knowledge, pedagogic knowledge, and pedagogic content knowledge, should we not provide scripted lesson plans (SLPs) that have built in content and pedagogy to supplement the lack? South African education policy makers gave an unequivocal YES answer to this question in 2009 with CAPS. Some school interventions (like the Gauteng Province Language and Mathematics Strategy) have doubled down on the wager and produced detailed SLPs along with extra materials and support to assist the teachers with adoption and implementation. The wager is that good SLPs will not only quickly improve learning in the classroom, but also provide teachers with good examples of effective teaching routines that will improve their practice. A win win or double bonus in gambling terms. Yael Shalem, Carola Steinberg, Hannchen Koornhof, and Francine De Clercq provide us with a discussion of different types of scripted lesson plans, an instantiation of SLPs in the GPLMS, and an illustrative critique of just how wrong these lessons can go. And wrong they do go with teachers unable to deal with misunderstandings of the learners and their own misconstructions. The reasons for this are complex, but one that stands out is the lack of detail in the lesson plans, resulting in oversimplified sequences that quickly go wrong as learners engage. The converse of this problem is that, in order to work properly, the underspecified SLPs need teachers with strong subject matter knowledge. If SLPs need teachers with strong subject matter knowledge then what is the point? SLPs are supposed to address the problem of teachers with weak subject matter knowledge, not rely on the very lack they are addressing. But the more SLPs try to supplement the content knowledge and pedagogic skills of teachers, the more unwieldy they become, as there are multiple variables and paths that need to be held in the account, making fully specified SLPs collapse under the weight of its own ambition. This results in a central tension – the more SLPs are needed by poorly qualified teachers the more content and pedagogy needs to be built into them; but the more content and pedagogy built into a SLP the more complex they tend to become, making them difficult for use by a poorly qualified teacher. Furthermore, highly specified SLPs are anathema to professional teachers with high levels of pedagogic content knowledge who want to rely on their own professional judgement.

To try and negotiate this charged terrain of SLPs we can use the excellent systems thinking paper by Bruce Brown in this journal issue to help us.

We can do this in an emergent way by taking the title of Shalem *et.al*'s paper, the findings of the analysis in the abstract, and the SLP example used on countable and uncountable nouns. Here are all three elements:

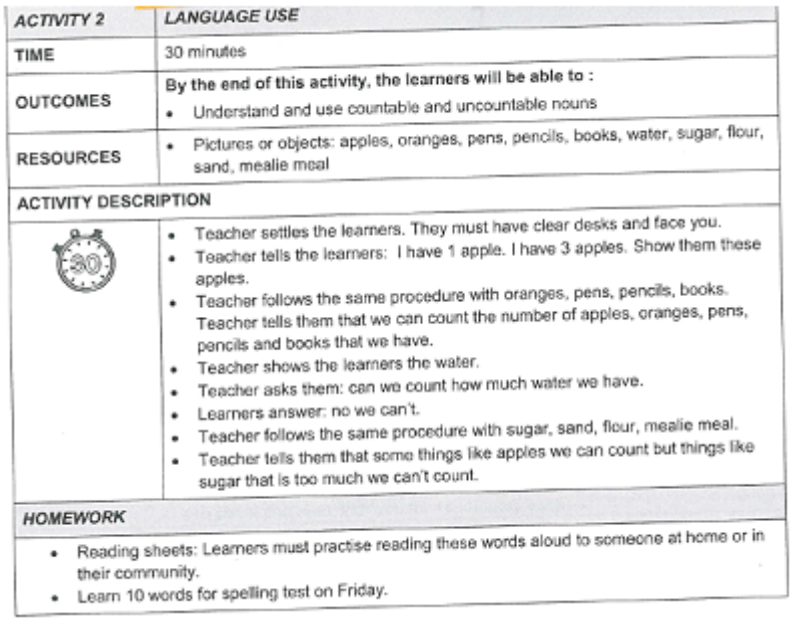
Title

The *what* and *how* in scripted lesson plans:…

Abstract

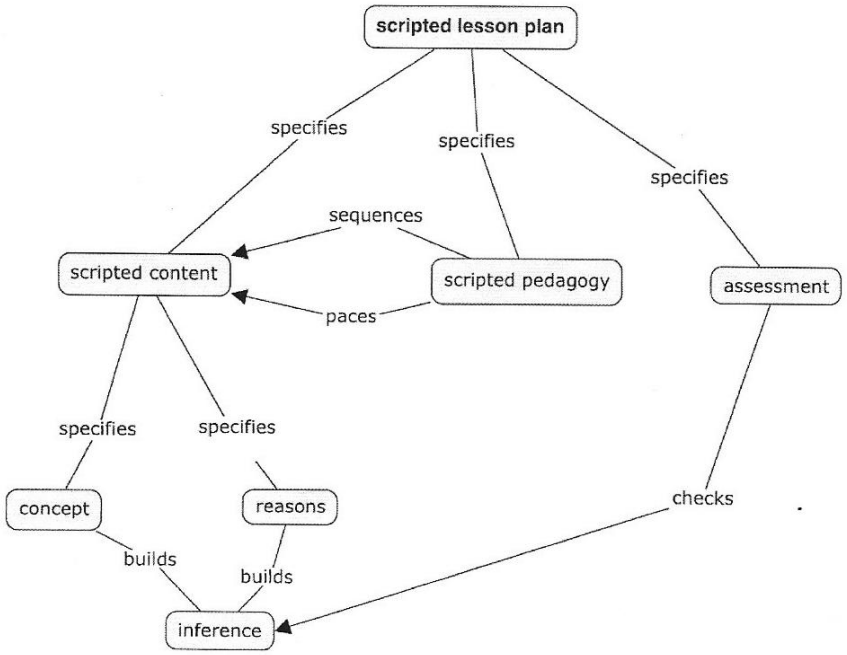
Lesson plans are advocated as useful forms of teacher support because they can expand a repertoire of teaching practices. But what kinds of scripted instruction can effectively guide and improve teachers' instruction and how can lesson plans achieve that? This article examines the nature and purpose of the scripted lesson plans (SLPs) used in the Gauteng primary education system and then investigates how teachers enacted these routinised SLPs. Through a review of the literature on teaching English language and on SLPs, the article assesses the opportunities and challenges afforded by the Gauteng Primary Language and Mathematics Strategy's (GPLMS's) lesson plans for Grade 3 English as First Additional Language (FAL). Then, through an analysis of an English FAL lesson taught differently by two teachers, it points to the many professional judgements made by the teachers as they enact the prescribed teaching routine. Our analysis suggests, firstly, that the knowledge resources given to teachers need to be considerably more detailed and, secondly, that teachers need strong subject matter knowledge to transmit the conceptual relations that underlie the teaching routines of the lesson plan.

Example of SLP



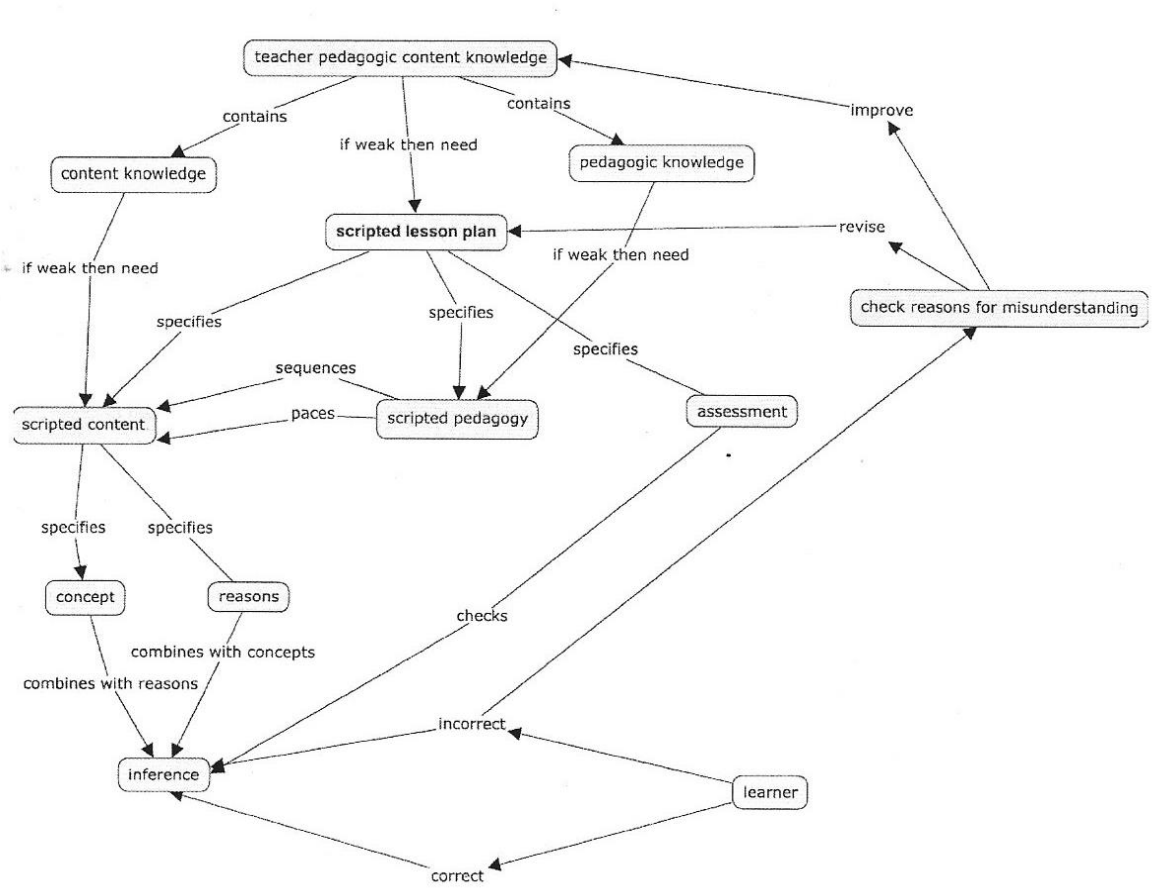
ACTIVITY 2	LANGUAGE USE
TIME	30 minutes
OUTCOMES	By the end of this activity, the learners will be able to : • Understand and use countable and uncountable nouns
RESOURCES	• Pictures or objects: apples, oranges, pens, pencils, books, water, sugar, flour, sand, mealie meal
ACTIVITY DESCRIPTION	
30	• Teacher settles the learners. They must have clear desks and face you. • Teacher tells the learners: I have 1 apple. I have 3 apples. Show them these apples. • Teacher follows the same procedure with oranges, pens, pencils, books. Teacher tells them that we can count the number of apples, oranges, pens, pencils and books that we have. • Teacher shows the learners the water. • Teacher asks them: can we count how much water we have. • Learners answer: no we can't. • Teacher follows the same procedure with sugar, sand, flour, mealie meal. • Teacher tells them that some things like apples we can count but things like sugar that is too much we can't count.
HOMEWORK	
• Reading sheets: Learners must practise reading these words aloud to someone at home or in their community. • Learn 10 words for spelling test on Friday.	

One key route into understanding SLPs, the title suggests, has to do with both the way SLPs work with content (the what) and pedagogy (the how). SLPs can specify content, specify pedagogy, or specify both. Content consists of two broad areas – *concepts* linked together with *reasons*. Pedagogy does two broad actions – it *sequences* and *paces* content. The content and pedagogy should come together into something learnt that should be more than just the concept or the reason but how they hold together in an *inference*. If a correct inference is consistently made and checked then it is possible to move on and build upwards in understanding. This suggests that it is not only the 'what' and 'how' that a SLP has to work with, but also feedback through assessment. We can put this into a diagram:



The GPLMS lesson plan specifies the content (countable and uncountable nouns); specifies the sequence (in the activity description); and specifies the pace (30 minutes). The activity sequence stipulates what each concept means through examples and reasons (apples can be counted, oranges can be counted, water cannot be counted) that build towards the learner making an inference about how countable and uncountable nouns work. If the learner makes the correct set of inferences then the teacher can continue onwards with the next scripted lesson plan.

To make sure we include Teacher Pedagogic Content Knowledge and the way a learner makes the inferences into the model, lets put them in.



Read the model from the top. If teacher PCK is weak then we can use SLPs to address the lack. If only content knowledge is weak then we can have a kind of scripted lesson that focuses mainly on content. If only pedagogic knowledge is weak then we can focus on scripted pedagogy, although this will tend to also work with the content. If the learner consistently makes correct inferences after the whole learning process has been gone through, then we can use the scripted lesson plan as a part of a far bigger network of lessons that builds upwards for cumulative learning. It's a fractal process – what plays out as a 30-minute lesson in this example continues to grow and expand into larger and larger processes. If the learner does not make a correct inference, then we have to go back and work out why this is the case and either work with the teacher's PCK or the SLP (or both) until the learner does produce the correct inference.

By no means is this a complete model, but it does have the teacher (with PCK), the lesson (with content, pedagogy, and assessment), and the learner (making inferences based on concepts and reasons) with a feedback loop that

moves forward if the learner makes correct inferences and backwards into the system if the learner makes incorrect inferences.

So what happened when teachers with a lack of PCK taught the scripted lesson on countable and uncountable nouns? Well, they ran into all sorts of unforeseen problems and difficulties that resulted in the learners making incorrect inferences. For example, its hard to count water, but very easy to count bottles of water. In the classroom, there is not simply 'water'; it's probably on the desk in a bottle or a cup. The containers are countable even if the water is not. This could cause a mistaken inference, but the SLP provides no guidance about what to do in this situation.

So the first question we have to ask of SLPs is whether they were trialed to ensure that mistaken inferences were eliminated? If the SLPs were simply generated in a hectic onward rush to meet crazy deadlines without care to improve the initial design, then all that has happened is built in inefficiency. But we can see from the above model that when mistaken inferences are made, there is a choice to go back to the scripted lesson or go back to the teacher, or both. But there are real dangers and tensions with all these options. To try and deal with all the possible misunderstandings of the learner and the teacher through an SLP means that it will be have to be incredibly tightly specified right down to the individual inference level. This is a highly specialised task, and I don't personally know anyone in South Africa who can do this properly. To try and deal with teacher misunderstanding by coaching and correcting them as they do the underspecified SLP is massively expensive, individualised, time consuming, and context/content dependent. To try and provide them with all the extra materials to deal with possible misunderstanding is to overload teachers who actually need things simplified. Even worse, to try and provide teachers with all the reasons why various options and choices are taken in the SLP, and then giving them flexibility to choose between the options overcomplicates and confuses the teacher even more. But to leave the SLP underspecified as the GPLMS does results in Shalem *et.al* pointing out that

> the knowledge resources given to teachers needs to be considerably more detailed, and, secondly, that teachers need strong subject matter knowledge to transmit the conceptual relations that underlie the teaching routines of the lesson plan.

GPLMS did provide extra material to supplement the curriculum and it did provide coaches to improve subject matter knowledge. The problem with

coaches is that the model is simply not sustainable when an intervention goes to scale. The problem with extra material is that teachers with poor content knowledge are going to struggle to combine all the supplementary material bits to the SLP as they are in separate documents and not actually a part of the SLP. It results in a default mode where all that the teacher has is the underspecified SLP as her guide. This can result in all sorts of issues where the teacher uses her own inadequate understanding of the content, inadequate appreciation of the pedagogic difficulties, and inadequate ability to deal in real time with the pedagogic content knowledge issues that arise as the underspecified SLP progresses. To see how this plays out, just read Shalem *et.al*'s account of how Palesa and Sarah struggled to teach this deceptively simple lesson.

However, if the SLP attempted to specify, in detail, the content, the pedagogy, as well as all the possible difficulties that could arise when teaching the content, then it will present teachers who have poor content knowledge with an impossibly complex SLP and doom the lesson to failure. It is very hard to build PCK into the SLP, because PCK works with professional judgement that uses content knowledge, pedagogic knowledge, knowledge of learners, knowledge of context, knowledge of the purpose of the lesson all in one simple move that responds in the moment to the learning issue at hand. It's the simplest and most elegant response to a massively complex set of issues. How do you build that into a SLP?

One educator thought he had the answer to this and spent much of his life perfecting how to do it – Siegfried Engelmann and Direct Instruction. Shalem et.al discuss his innovation in their paper.

> DI is built on two premises. First, if 'technical problems' such as "ambiguous communication, the learner's lack of necessary background knowledge, or inadequate practice to master what is presented" can be controlled "the mind will learn [as] it is wired to do so" (Barbash 2011, p.10). Second, teachers do not possess the expertise to teach well and they need curricula which are teacher-proof (Reeves 2010, p.244). By building a logical sequence required for the concept at hand, precisely specifying the teachers' examples and prompts, and allowing for only one correct answer from the learners, DI intends to minimise learners' wrong inferences and/or conceptual ambiguity, making sure that the children will receive the rule of the concepts they need to learn. The prescribed style of instruction is brisk, with the teacher constantly monitoring student understanding (Kozioff *et al*., 2001 in Kim & Axelrod 2005, p.114) through teacher-directed prompts and modelling.

The key elementary unit for the education process in DI is the inference. Learners are wired to do this, all humans are – we can all infer. The teacher proof script works at the level of an individual inference where a minimal set of concepts and reasons combine in a way to make the learner think and decide on an answer, which if properly done, will result in a correct inference. Inferences build on inferences resulting in an expanding and deepening web of knowledge.

So my first response, when seeing the GPLMS SLPs, is that they were not specific and detailed enough. Most other responses I heard when Fleisch and crew did their assorted roadshows were exactly the opposite. They had to fight against many supposed critiques about how their SLPs were over specifying and over controlling. But when the GPLMS is looked at through the lens of DI then it appears hopelessly under specified, and hopelessly under tested for possible misunderstanding.

DI offers a capacity to put PCK into SLP by insisting that only one script is followed that has tested for where learners will struggle and corrected the script to deal with misunderstandings. DI can deal with teachers lacking in content knowledge, pedagogic knowledge, and assessment skills by ensuring that the script does all of this, step by inferential step.

But the consequences of adopting DI whole scale throughout subjects and schools are dire. It is teacher proof. This means that the profession of teaching lowers its status because the need for specialised judgements are radically reduced. It dumbs down the profession and we know that good teachers are key to good systems of education. As much as DI can work at primary school with elementary levels of knowledge, it becomes far harder to do successfully with higher grades and differing subjects like the Arts and Humanities. Good teachers with high levels of PCK tend to despise DI and cannot stomach being forced into a script and could leave the ‘profession’. Whole scale adoption of DI within a system is toxic.

Imagine, for example, the subject of Political Science done on DI principles. Sherran Clarence shows us how Political Science tends to operate as a knower code that works on developing a certain kind of sophisticated consciousness and approach to life.

> In Political Science, as an example, each course in each year of the undergraduate degree would need to incrementally and cumulatively develop students’ ability to read texts with

> critical and careful comprehension, understand the ways in which the authors are analysing and unpacking political and/or social problems, and further begin to position themselves to make and defend their own arguments.

Scripted lesson plans in Political Science would directly go against its 'spirit'.

There is nothing stopping a script working towards a knower code, it can do this, but there are better ways of doing it when the whole person being produced by Political Science is taken into account

That said, new technologies are quickly working out how to embed knowledge and pedagogy into a lesson in context specific ways that effectively get rid of the need for the teacher. Uber is the model – first you outdate an organised career (taxi driver) with on demand service (uber driver); then you outdate the uber driver with automated vehicles through improvements in Artificial Intelligence (AI). This is what Pearson wants to do, and is doing, with education right now. Pearson is the Uber of education and is using Artificial Intelligence, personalised learning paths, big data, learning eco-systems, anytime anywhere learning, learning is earning, 1:1 device initiatives, future ready schools, to transform education in ways that automate teaching. We are familiar with how YouTube provides immediate lessons for almost any subject, resulting in teachers often playing YouTube lessons in their class as a default on demand option and then teaching around it, contextualising it, integrating it into the curriculum. The teacher is still needed in the YouTube example. But, right now, learner customers can get a diagnostic of where they currently are in a knowledge field, and get a personalised learning path that provides them with what they need to learn and feedback when they go wrong. SLPs are outdated technology as we move into a world where AI not only provides the lessons but also the assessments that work out what you have done wrong and how to fix it. It's not only PCK our new teachers will need, but also the ability to instructionally design lessons that track learner responses with individualised responses that allow cumulative learning with a thousand paths, not to wisdom, but to a skill needed right now, somewhere on this planet, for a short while. This is what a PGCE should be doing with our students right now – teaching them to become producers of content with pedagogy and assessment embedded inside. The nature, function, and possibility space of teaching and learning is transforming more rapidly right now than ever in the history of education, but most education departments in South Africa have no idea what

is happening here, even though they should be at the cutting edge. Frankly, I am embarrassed.

A negative consequence of current innovation is the replacement of professional judgement with sophisticated algorithms. This spectre of increasing unemployment for the educated and the specialised is becoming a daily reality. Both the amount and quality of jobs are decreasing, resulting in students leaving universities and technikons with high hopes but decreasing chances of finding meaningful work. To configure education towards the workplace, when the workplace is not providing new jobs is a terrible consequence lecturers need to square up to. To pump out graduates into a world of increasing unemployment is a question we have to square up to. One response of governments is to identify in demand skills and professions and then insist that higher education quickly configures itself to meet these demands, or else face defunding or replacement by private providers happier to adapt when money leads the way. The problem with this option is that online educational providers like UDEMY, UDACITY, COURSERA, EDX, LYNDA.COM are already providing hundreds of thousands of courses on demand and continuously updated by course designers getting paid per subscription. Another response is to start trying to work out what it is students actually need in the world they live in and help provide them with the skills and understanding to intelligently and critically deal with a world of increasing inequality and exploitation.

> You must understand how you live as a human being, and how the person next to you lives. . . For example you must know that when food is produced, how the systems that are set up in the world operate. It enables you to understand how things work, and how you as a person fit in, and understand how you need to survive as an individual and how your brother/sister next to you survives. That is what I know the importance of education to be. . . Education must give you the foundation to understand how the world systems work, or to create new systems of your own if necessary (Yila).

Lucky Maluleka and Anne Harley provide us with an account of what type of education ten rural youth in the Limpopo province feel is appropriate for local development needs. Rather than education taking the youth away from their local context and divorcing them from their community through abstract and mechanised knowledge and skill; ways of educating are explored that improve local lives and embed students within the communities in productive ways, rather than pretend they will leave because of a glorious job that never comes and then leave them abandoned in the community caught between dream and despair.

Maluleka and Harley remind us that, behind the world of high tech dreams (or nightmares), we have to hold onto the lived reality of most South Africans and ask how education can serve their best interests. Many South Africans cannot even read at a basic level, with around 5 million of our citizens still totally illiterate. John Aitchison provides a characteristically bracing account of the successes and failures of adult literacy programmes in South Africa. The Kha Ri Gude literacy campaign can be counted as a success with around 3 million adults successfully brought into functional literacy, but without any follow up investment, there is a real danger these gains will be quickly lost. Writing this editorial, I feel the massiveness of the educational endeavor, spinning from the sophisticated algorithms of Artificial Intelligence to the old woman learning functional literacy in her hut surrounded by cattle and little children, spun in a web of increasing inequality and global warming. It is the best of times; it is the worst of times.

The roles and functions of universities in this space/time catch these issues in a microcosm. What does it mean to be an academic in a world where 'post-truth' is the word of the year, where professorships are decided on what funding you pull in, where multi-nationals provide the funding needed for research in the very things they are subverting and destroying, where journal articles are written for the money they earn not the readership they receive, unless readership is a metric earning money. To get an idea how universities engage with communities, take a look at Marota Aphane, Simbao Mtapuri, Chris Burman and Naftali Mollel's account of academic interaction with social partners in a case from the University of Limpopo. At the heart of this research question is the issue of the boundary between universities and outside interests. In South African education theory we continuously talk about boundaries, but do not directly theorise how boundaries actually work. This takes us into Systems Theory, into Luhmann (1995), into autopoietic theory, into living systems theory (Miller, 1978). A boundary has to be able to open to needed inputs but closed to harmful inputs; it has to open when it needs to push outputs out, and has to close when it is losing energy or information through harmful outputs (Bailey, 2006). Boundaries open and close all the time – it is not open or closed forever – its purpose is to be able to open and close at the right time under the right conditions. Just as important is to ask what the *type* of inflow or outflow across the boundary is. Is it helpful or harmful or fatal? Do two messages neutralise or cancel each other out? Is the message a false signal, is it noise? Is it linear or non linear (normal impact or exponential impact)? Is it contingent or catalytic to massive

change? Simple formalisation of boundaries into weak and strong (Bernstein) is only the first baby step – we have such a long way to go.

One of the most important boundaries in South African education (and education in general) is the boundary between grades, signaled at the end of the year by a pass or fail. Paul Nwati Munje and Rouaan Maarman provide us with a carefully thought through and researched account of the problems and difficulties we are currently experiencing with this boundary. He shows how the School Progression Policy, with its automatic promotion effect is having negative consequences and enters into a discussion of the advantages and disadvantages of grade retention and automatic promotion. He uses the Capability Approach to theorise the freedoms and unfreedoms generated by the policy and its effect in high poverty areas. It is a useful theory to gain a grasp on the social justice issues surrounding grade retention, but care should be taken when extrapolating these insights into the complex emotional, developmental, social, political, cultural, administrative systemic issues surrounding grade retention. It's a multi-level problem with multiple and complex feedback loops. It would have been interesting to use Bruce Brown's paper on systems thinking to think through the effects of grade retention. Systems thinking should be a first level skill we use in education, a basic skill done as a precursor to theorising, so it is with gratitude that the *Journal of Education* publishes Bruce Brown's paper. Don't just read his paper – try it out. Go onto CMAP and download CmapTools at http://cmap.ihmc.us/. Theorising is less about taking a French concept and applying it to education, more about developing systemic models about how education works (and most about finding educational mechanisms that explain why some process happened).

It is fitting to end off the final issue of 2016 with a paper on the pleasures of writing retreats. Jane Castle and Moyra Keane provide a well researched account of how retreats develop writer confidence as well as a sense of community and collegiality. In a busy life in a busy city in a busy university it is vital to find time and focus to retreat from all else and concentrate on writing. Doing this in a communal space where others are writing as well produces a double bonus win win scenario where your writing improves at the same time as your relations with colleagues. But please have something worthwhile to write about, and that means becoming part of research communities that have thriving social and intellectual energies. It also means that you have to read the latest research and thinking on a daily basis, it means you have to engage with what it means to educate in this twenty-first century

with a human species hurtling towards Artificial Intelligence as it impoverishes most of its own, destroys the rich diversity of our planet, and induces a global catastrophe we are responsible for but cannot stop.

References

Bailey, K.D. (2006). Living systems theory and social entropy theory. *Systems research and behavioral science*, *23*, pp.291–300.

Luhmann, N. (1995). *Social Systems*. Stanford: Stanford University Press, CA.

Miller, J. (1978). *Living systems*. New York: McGraw-Hill.

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