

5.

Three Sophists -
what education must not be!

MICHAEL JOHANN VAN HEERDEN

14.

Lighting fires from fires:
A description of the research
entitled 'Kindling Fires'

LEIGH KILPERT

25.

Risk, resilience and retention -
a multi-pronged student
development model

**MEGAN DU PLESSIS AND
RENE BENECKE**

34.

Email messages:
Towards a pedagogy of caring

YUGAN AUNGAMUTHU

45.

Social and academic
integration in an extended
curriculum programme

GREGORY H. BASS

55.

Practitioners' Corner
Collaborative learning of mathematics
by educationally disadvantaged
students at a university

**SHAN PILLAY AND
ANESHKUMAR MAHARAJ**

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Lighting fires from fires: A description of the research entitled 'Kindling Fires'

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ABSTRACT

This study examined students' responses to assessment for evidence of cumulative learning. The hypothesis was that if students' learning is cumulative, then they will be able to apply their knowledge and skills productively in industry. The research used Maton's (2009) concept of 'semantic gravity' as a tool to determine the relative context-dependency of the students' knowledge. A higher education institution provided the Journalism curriculum for this research. Assessments were coded according to 'knowledge principles' described by the research tool. The coding allowed these responses to be given a 'weight' of semantic gravity, i.e. a level of context-dependency. The codes were then examined for patterns that would reveal evidence of cumulative learning. The study found evidence of cumulative learning, but because of certain limitations, this learning was not fully developed. The findings of this research have implications for an enriched understanding of the potential for students to be productive after they graduate.

*The mind is not a vessel to be filled but a fire to be kindled.
Plutarch (c.46–119 AD)*

INTRODUCTION

The research entitled 'Kindling fires' was inspired by Maton's (2009a) theoretical concepts of 'cumulative' and 'segmented' learning. Cumulative learning means that students are able to use new learning to build on their previously acquired knowledge or skills. It means that graduates will be able to apply what they have learnt during their studies to unfamiliar situations in industry. Segmented learning means that students cannot make significant links between the knowledge and skills they have acquired, and new learning does not develop from these. They will not be able to take what they have learnt beyond the culmination of their studies. Maton (2009a) theorises that cumulative learning is based on the relative context-dependence of knowledge. If students can abstract knowledge from the context in which it is learnt, then they should be able to use it in an unfamiliar context. Conversely, students mired in the learning context may not be able to use their learning in any context other than that in which it was learnt.

The research examined students' responses to the assessments for Newswriting 2, a module in the second year of a private, higher education Journalism qualification, for evidence of cumulative learning. The focus was on whether the curriculum constrained or enabled cumulative learning. The conceptual tool developed for this research was used to code the students' responses by the inherent knowledge principles, and nominally ascribe a 'weight' of semantic gravity.

This paper will provide a synopsis of this research, outlining what prompted the study and the context, the theoretical grounding of the research, the method used, and the main points from the analysis of the results.

RELEVANCE TO SOUTH AFRICA'S EDUCATIONAL CONTEXT AND INTERNATIONAL INTEREST

The South African government has been attempting to develop and democratise education simultaneously. The Education White Paper 3 of 1997 summarises these competing priorities. On the one hand, higher education must

address the development needs of society and provide the labour market, in a knowledge-driven and knowledge-dependent society, with the ever-changing high-level competencies and expertise necessary for the growth and prosperity of a modern economy ...

on the other, higher education must help transform South African society, as

... part of the broader process of South Africa's political, social and economic transition, which includes political democratisation, economic reconstruction and development, and redistributive social policies aimed at equity (Department of Education, 1997: 1,3).

Among the mechanisms the government has used to facilitate these changes is a programmes-based and outcomes-based definition of higher education, which includes the modularisation of qualifications and the explication of learning outcomes. Many of these changes indicate that the government encourages curricula to be 'supportive of what they see as the needs of the economy' (Moore & Young, 2001: 447). The focus of this approach is the trainability, employability and assumed productivity of those receiving an education. There is an emphasis on preparing students for lifelong learning and on education that will lead them into useful vocations.

The Journalism programme and its assessments, on which this research focuses, is an example of a vocation-driven curriculum. This two-year diploma is offered through a private provider that operates in South Africa. My study considered whether this Journalism curriculum might be helping or hindering the kind of learning that graduates need in order to be productive after completing their studies. The intention was to see whether this curriculum has the potential to produce graduates who are lifelong learners. The selected window for this examination was the students' responses to the assessments in one of the second-year modules of this Journalism curriculum - Newswriting 2.

Writing in Australia, Maton (2009a) frames the issue of lifelong learning from the point of view of what he calls 'cumulative' and 'segmented' forms of learning. Maton says policy dictates that curriculum design must encourage cumulative learning to create graduates who are able to adapt to the requirements of the rapidly-changing working world. In 2009, he examined a study conducted by Bennett in 2002 in Australia, for evidence that the selected curricula, and their assessments, actually did what they claimed, that is, enable cumulative learning. This research emulated Maton's investigations (2009a) and reflected on his findings from a South African perspective.

KEY CONCEPTS

The key concepts relevant to this research are: cumulative and segmented learning, context-independent or context-dependent knowledge, and semantic gravity. Students who experience cumulative learning should be able to take the higher-level knowledge principles (which consist of accumulated information and skills) they have acquired and use them wherever they find employment. This research examines the

students' responses to assessments to see whether they are using these context-independent, higher-order knowledge principles.

The student who experiences cumulative learning will be able to use the information and skills beyond the context in which they were learnt. This creates context-independent knowledge. If the student experiences segmented learning, then the information and the skills will require the same context to be useful or meaningful. This creates context-dependent knowledge. But what is context? I separated context into three types: Context 1 is the students' Newswriting 2 manual, which contains the selected facts and skills upon which students will be assessed; Context 2 is the created intermediate context - the abstracted version of these facts and skills, modelled on how they would be used in the media industry; and Context 3 is the real-life practice of journalism. If the responses are less context-dependent (freed from Context 1 and situated within Context 2), then the curriculum enables cumulative learning, and we can assume that the students will have gained knowledge and skills that can be applied beyond their qualification (Context 3). If the responses show that learning is stuck in the context from which it came (Context 1), then the students will have experienced segmented learning, and thus will be unable to make immediate and effective use of what they have learnt on graduating.

MATON'S THEORIES AND RESEARCH

Maton (2009a) extends Bernstein's concept of the pedagogic device (2000). While accepting that Bernstein's model addresses the production of new knowledge in intellectual fields, he suggests that Bernstein's ideas can be developed further if we distinguish between hierarchical and horizontal curriculum structures. A hierarchical curriculum structure is one in which the information builds on the previous year's or module's learning 'through integration and subsumption' of knowledge (2009a: 45), whereas a horizontal curriculum structure increases knowledge through 'segmental aggregation' (*ibid*).

Maton's theory provides a lens for examining the way students learn. If they develop their understanding by using their previous learning as a foundation, expanding what they know, and by exercising this knowledge in new and unfamiliar contexts, this is 'cumulative learning' (*ibid*). If, on the other hand, they develop their understanding by acquiring knowledge in discrete chunks and are unable to transfer this learning because it is context-specific, then this is 'segmented learning' (*ibid*). Maton relates these two ways of learning to the aforementioned hierarchical and horizontal curriculum structures, and concludes that the former might assist a student's cumulative learning, since it is designed to build on accumulated knowledge, but that the latter might hinder it.

Maton emphasises the relevance of the context-dependence or context-independence of educational knowledge for these forms of learning, which he refers to as 'semantic gravity', the concept he uses to measure 'the degree to which meaning is dependent on its context' (*ibid*: 46). He explains that if a notion is strongly context-bound, meaning that you require an understanding of its context in order to get to make sense of it, then this notion has a strong semantic gravity. Conversely, the weaker the attachment to context is, the weaker the semantic gravity.

This means that cumulative learning, with its emphasis on context-liberated information and understanding, has a weaker semantic gravity than segmented learning, which is rooted in context. Maton asserts that 'cumulative learning depends on weaker semantic gravity and segmented learning is characterised by stronger semantic gravity, constraining the transfer of meaning between contexts' (2009a: 46). This statement leads to his hypothesis that 'one condition for building knowledge or understanding over time may be weaker semantic gravity' (*ibid*).

Maton's examination of Bennett's 2002 study revealed that the students' responses to their assessments reflect their difficulty in separating from the context of their studies and reveal their experience of segmented

learning (*ibid*). He suggests that this is because of 'a mismatch between [the] aim of enabling students to acquire higher-order principles of knowledge and their means, which focus on knowers' dispositions rather than explicitly articulating these principles of knowledge' (*ibid*: 44).

To understand what Maton means by 'knowers' dispositions', we need to review his Legitimation Code Theory. This theory provides a framework for examining what form of knowledge is considered valid in different disciplines and a means of describing the basis for legitimate claims to truth in a field. There are four languages of legitimation or legitimation codes (Maton, 2000, 2006, 2009a,b): a knowledge code, a knower code, an elite code, and a relativist code. Maton hypothesises that a hierarchical knowledge structure (and by extension a hierarchical curriculum structure) is characterised by a knowledge code (what you know) and a horizontal knowledge structure (and by extension a horizontal curriculum structure) by a knower code (who you are) (*ibid*: 46). He uses his Legitimation Code Theory to explain why the students' responses to assessments in Bennett's research did not reflect cumulative learning. He proposes that the emphasis on a knower code in the assessments meant that students responded from a knower code, while what was intended and valued in the curriculum was a knowledge code, as could be seen in the course designers' attempts to encourage cumulative learning. My research suggested that the practice and discipline of Journalism is driven by an elite code and my analysis recommended how the curriculum should respond to this fact.

In this research I examined Maton's suggestion that cumulative learning is dependent on a weak semantic gravity, firstly by loosely ascribing a particular semantic gravity to the Journalism curriculum, and secondly by trying to gauge the potential 'weight' or semantic gravity of students' responses to the assessments in the Journalism curriculum; that is, I investigated how context-bound the students' responses are. The context in this case is the content of the students' Newswriting 2 manual and not the teaching in the classroom. It is important to note that semantic gravity is considered to be an attribute of both the individual assessment questions and the students' responses, and it is these responses that are analysed as samples of the curriculum.

JOURNALISM AS PROFESSIONAL DISCIPLINE AND REGION OF KNOWLEDGE

Certain features of the field of practice for Journalism can make it problematic to translate practice into theoretical knowledge, and thus describe the discipline of Journalism. It is obvious that a good journalist needs to have a background in many subjects, even though, as Vorster admits, 'Journalism as a field does not have a generally agreed-upon coherent body of knowledge which makes up the curriculum' (2009: 140). Barnett would agree with this - when describing vocational pedagogy, he explains that it fills a space between subjects and jobs and that 'academic subjects do not map onto jobs in any very straightforward manner' (2006: 145). When examining knowledge fields, Muller noticed that 'independent disciplines may converge to form a new field, or "region", of knowledge, comprised of clusters of disciplines now come together to focus on a supervening purpose' (2008: 15; italics in original). Academic Journalism can be described as a region of knowledge (instead of a body of knowledge) that provides the collection of meta-theory for a particular professional practice (*ibid*). In fact, Journalism can be described as a region of knowledge that is 'at the interface between disciplinary knowledge and the field of practice' (Bernstein, 2000: 52; Barnett, 2006; Wheelahan, 2007).

Gamble (2009) would refine this by suggesting that Journalism belongs to the empirical domain, the everyday world of practice, and that it specifically takes the form of principled knowledge (based on what Gamble calls the 'discursive principle type'). Journalists often claim to work by instinct, which may just be another way of saying that the principles they apply are very deeply entrenched in the procedures they use. Extracting these principles to create a set of rules to use in developing a curriculum is part of the difficulty. Muller would say that creating a Journalism curriculum is trying 'to "pedagogise" what is essentially contextually tacit procedural knowledge' (2008: 26).

The qualification must make room for the situated knowledge that is related to practical work tasks (Barnett, 2006). Barnett distinguishes between disciplinary knowledge and situated knowledge by explaining that situated knowledge (by its very nature) is 'often trapped within its context of application, while disciplinary knowledge generally aspires to some degree of context-independence' (*ibid*: 146). Hence curriculum developers are faced with dual difficulties: extricating slippery tacit and implicit procedural knowledge from the field of practice, while linking it to meta-principles that exist in a variety of disciplinary knowledge. This is an attempt to design this vocation-related curriculum to 'face both ways', as Barnett (*ibid*) puts it: towards both the practical aspects of the occupation it derives from and the theoretical concepts that explain the underlying processes that influence the occupation.

In this curriculum, we can see an attempt to design 'authentic activities' - 'experiences that reflect real-world ways of knowing and doing ... [that] allow learners to transfer knowledge from formal education to practice' (Bennett *et al*, 2001: 73). The intention in getting students to write articles in various news writing styles is to give them some experience of being 'real' journalists.

We know that knowledge from a number of disciplines, as well as procedures from the field of practice, are brought together to create the Journalism curriculum. These different sets of knowledge do not necessarily sit comfortably together. To make sense of the segmented knowledge in this curriculum, the student may need to refer back to the structure and context in which he or she acquired the knowledge, which means that the curriculum could be strongly context-bound. This suggests the curriculum has a strong semantic gravity. However, some parts of the assessments are intended to be 'authentic' and others are intended to encourage students to use higher levels of cognition. This points to an attempt to weaken the semantic gravity, which leads us to wonder exactly which way this curriculum is facing. These few factors might create a 'contextual' tension that pulls in opposite directions and students could be caught in the middle of it.

METHODOLOGY

This research aimed to reveal the form of learning (cumulative or segmented) the Journalism curriculum encourages by focusing on the assessments in one module of the second year of the programme - a sample component of the entire curriculum. I examined whether there is evidence of cumulative learning in the students' responses to assessments, that is, whether the responses are context-dependent (having strong semantic gravity) or context-independent (having weak semantic gravity). If there was this evidence, then it is possible that these graduates will be able to apply their learning to unfamiliar situations after graduation, and therefore be productive in their chosen industry.

The question I asked was:

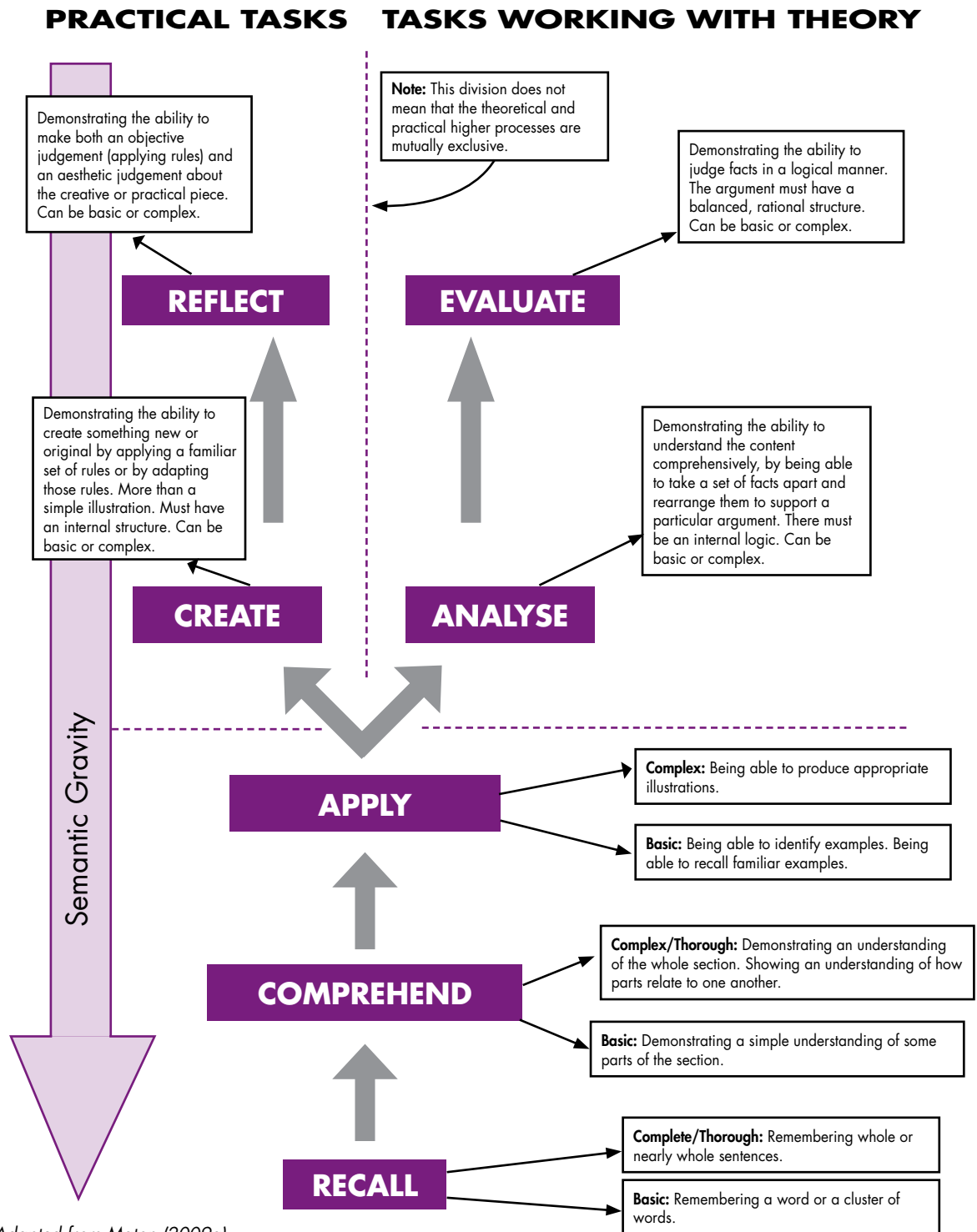
- What evidence of cumulative learning is there in students' performance on assessment tasks in a private higher education Journalism curriculum?

Before analysing the students' responses to their assessments, I reviewed the assessments - both tests, both assignments and the final examination. I studied each question in these assessments and, on the basis of what the question asked for and what the memorandum suggested, I deliberated as to which knowledge principle would be expected in the students' responses and what reference to context (what level of semantic gravity) each question seemed to require. By 'knowledge principle' I mean the categories of knowledge developed for this research project's research tool (see Figure 1).

The students' responses to questions in the assessments were broken up into individual 'units of meaning', which Maton describes as 'passages conveying a single coherent meaning' (2009a: 48). For this data,

this meant reviewing the student's answer as a whole. In some cases, the student's answer was simply one word, or a bulleted list of words or phrases; in other cases, the student's whole article was taken into consideration. Each of the 961 'units of meaning' was coded by one knowledge principle or a sequence of knowledge principles, according to the research tool I developed from Maton's language of description for semantic gravity (2009a). Figure 1 illustrates this research tool.

Figure 1
Diagram of the research tool to measure semantic gravity



The concept of 'knowledge principle' can be defined as the cognitive activity the student seems to have used to answer the question: remembering what was learnt, understanding what was learnt, applying what was learnt, and so on. This cognitive activity reflects the 'what' and 'how' of the student's learning with regards to that question, and how context-dependent the answers are. An initial review of the assessment questions, and a few of the students' responses, revealed that the six categories that Maton drew from Bennett's research would be inadequate for describing the forms of learning and thinking in the Journalism students' responses. I needed to re-create categories that would reflect the knowledge principles that the Journalism students were using and at the same time maintain the continuum for measuring semantic gravity.

I decided to use Bloom's Taxonomy of Educational Objectives, despite the debate surrounding this popular tool (1956, revised by Krathwohl, 2002). This taxonomy provided me with a new set of categories: Remember, Understand, Apply, Analyse, Evaluate and Create. Through the iterative process of using this tool, I discovered that Bloom's categories did not do justice to the practical tasks that students were required to perform. For the purposes of this research, I found it inappropriate to rank 'Create' as the highest form, while relegating analysis and evaluation to lower levels. It was at this point that I chose to split the taxonomy after 'Apply' to create two divisions - one for coding practical tasks, and one for coding tasks that involved examining theory. This gave me seven categories, ranked from stronger to weaker semantic gravity.

Like Bloom (1956), (Krathwohl, 2002), I could see that the categories of knowledge principles were not tightly bound. I could see how each category might overlap with the category above it. Students might also 'jump around' between the various levels and not follow a simple trajectory that included all the categories. I also noticed that there were levels within the categories. To illustrate these phenomena I included levels of 'Basic' and 'Complex' for each category of knowledge principle, and used grey arrows to indicate the 'flow' through the categories. I attempted to take into account these 'fuzzy' boundaries and the internal levels while keeping the tool as user-friendly as possible.

This coding was intuitive, based on personal judgement. I was looking to see how closely the student's response matched what the assessment question seemed to expect. For example, if the question asked the student to list five factors, and the student responded by doing exactly that, then I coded the answer as R (for Recall), as the student was merely remembering what was in the manual. However, if the student answered not just by naming each of these factors, but rather by describing them, then the answer would be coded C (for Comprehend). If a student remembered, for example, three of the five factors, but was unsure of the other two and tried to complete the answer by offering an understanding of what they could be, then the response would be coded R (C) (for Recall, with some Comprehend). If a student used Comprehend to answer a simple Recall question, then this was evidence of the use of a higher form of knowledge principle, and thus a weaker form of semantic gravity than was required.

Once I had finished coding the individual student responses, across all of the assessments, I examined the coding for patterns. This was not as straightforward as grouping the units of meaning according to the seven categories of knowledge principles and counting the number of instances: it was more intuitive and imprecise. I examined the trends in the coding to see if one type of knowledge principle was more evident than others. I also looked for anomalies in the students' responses; not necessarily incorrect answers, but whether students were using higher or lower levels of knowledge principles than the question seemed to expect. These observations provided the basis for my analysis.

ANALYSIS OF RESULTS

There did appear to be some evidence of cumulative learning in the students' responses, but the research question asked for 'what evidence'. Four salient observations were drawn from the analysis of the data. Firstly, there appeared to be a gap in this curriculum between practising lower-level knowledge principles, with strong semantic gravity, and practising higher-level knowledge principles, with weaker semantic gravity. Students would try to release themselves from Context 1 when limited by questions that required lower-level knowledge principles, but struggled to be truly successful in using higher-level knowledge principles (with weaker semantic gravity). These two kinds of behaviour could be described as 'overreaching the target' and 'falling short of the target'. I suggested the following reasons for these behaviours.

In terms of 'overreaching the target', students repeatedly 'over-answered' the questions and this indicated that they were unclear as to what was expected of them in assessments. They were using whichever knowledge principles were available in their toolbox of abilities. By pushing beyond the level that is expected of them, these higher education students seem to be straining against the boundaries that hold them. However, in many cases, students were awarded marks primarily for lower-level knowledge principles (like Recall), including reproducing the descriptions of each point of advice, rather than higher-level knowledge principles (like Comprehend). Those who combined these knowledge principles (as many did), did so either to add to their answers to ensure they received as many marks as possible ('over-answering'), or because they could not remember the exact wording of the points of advice but wanted to explain that they understood them. This observation highlights the use of a knowledge code - what is being expected and rewarded is the facts or abstraction directly from the facts, and not the students' personal opinions regarding these facts (Maton, 2009a,b).

'Falling short of the target' is evident when students were asked to produce creative pieces of writing in the form of media articles. Most students were able to use the higher knowledge principles in a basic sense, by building up from lower knowledge principles layered beneath them, but some struggled to produce truly complex creations - ones that had a logical structure and were also original and appealing.

I concluded that students needed to assimilate all levels of knowledge principles properly in order to experience complete cumulative learning. The curriculum may require further scaffolding in between the lower and the higher knowledge principles. I recommended that this Journalism curriculum incorporate further opportunities to practise mid-range knowledge principles to help solidify the students' abilities before moving onto higher-level, more context-independent tasks. This might help alleviate the contextual tension present in the curriculum and aid further cumulative learning.

Secondly, I noticed that some students' responses 'skipped' a knowledge principle and simply used a higher-order one. These responses were rewarded when the student's explanation approximated the correct answer. If the student was guessing, he or she was unlikely to receive marks for that question, despite using a higher-level knowledge principle. The research tool used for measuring semantic gravity represents both a continuum and a hierarchy of knowledge principles, a layering of different types of learning. Students cannot choose to use a single knowledge principle in isolation from the knowledge principles that surround it. To be effective and significant, the skills and learning reflected by knowledge principles cannot be used in a segmented fashion, but must be used cumulatively. What we can see here is that higher-order knowledge principles (with weaker semantic gravity and a looser relation to context) are not sufficient in themselves; to be both correct and meaningful they must contain a foundation of lower-order knowledge principles.

This observation also showed that cumulative learning can never be entirely devoid of context. Weakened semantic gravity, and the consequent cumulative learning, does not imply leaving the base of strong

semantic gravity behind. Weakened semantic gravity means that the load becomes lighter so that the students can take their learning with them. They should still remember the fundamental, abstracted rules that they originally learnt; they have simply acquired context-loosening techniques for using them anywhere. This observation also showed that no matter how adept at writing or persuasive at arguing a student is, part of the answer has to be 'right'. A student's response and supposed learning will be meaningless without some reference to the consensus of information as defined by that region of knowledge.

My findings and observations indicate that to be able to perform effectively in the higher-level practical tasks, students must have thoroughly assimilated the underlying theoretical knowledge base (Wheelah, 2007; Gamble, 2009). I concluded that no matter how well students are able to abstract what they have learnt, they will always carry the foundation of context-bound knowledge with them. For cumulative learning to be comprehensive and complete, the underpinning knowledge base has to be wholly integrated and absorbed.

Thirdly, I discovered that although the assessments appeared to be offering the students opportunities to practise higher-level knowledge principles, the memoranda were constraining the marker by encouraging her to reward lower-level knowledge principles over the higher-level ones. A curriculum and its assessments may be well designed to enable cumulative learning, but unless this form of learning is seen to be valued through results and feedback, students will hesitate to use the higher-level knowledge principles that provide evidence of cumulative learning. I concluded that cumulative learning would be further enabled in this curriculum if lecturers who mark these students' assessments were given more freedom to reward thinking and skills that are beyond the context of the students' studies. The procedures set up to standardise this curriculum, and ensure that it complies with strict education policies, appeared to be limiting the institution's ability to reward higher-level knowledge principles in students' work. A compromise needs to be reached, between the benefits of standards and the pitfalls of standardisation.

Lastly, this research aimed to emulate Maton's similar research and test his proposition that a mismatch of codes between curriculum intentions and curriculum means, constrains cumulative learning. On the premise that Journalism is an elite code and that there is emphasis on both knowledge at lower levels and the knower at higher levels (for creative practical tasks), then it would appear that to enable cumulative learning in an elite code, the curriculum must be designed to facilitate an elite code. When Maton (2009a) examined Bennett's research, he came to the conclusion that there was a mismatch of codes for the curriculum he was investigating. He explains that this mismatch is the reason why cumulative learning might not be occurring. He goes on to state that students who are likely to succeed with this type of curriculum are the ones who already possess the knowledge principles for which they are being rewarded (*ibid*). But it may not only be the legitimation code that is relevant for enabling cumulative learning. The professional education curriculum that Maton examined may have a different organising logic and may be based in a different form of knowledge. Cumulative learning in vocation-based curricula may differ according to the structure of knowledge in the originating vocation. This extends Maton's premise by stating that cumulative learning may be enabled not only by a knowledge code, but also by correctly matching the legitimation code of the discipline to the legitimation code of the curriculum.

CONCLUSION

This research investigated what evidence of cumulative learning there was in students' responses to a set of assessments. This was achieved by examining the level of context-dependency of the responses. Context-dependency was measured by ascribing a code that indicated a particular 'weight' of semantic gravity: strong semantic gravity revealed a strong dependency and weak semantic gravity a weaker one. This research accepted Maton's premise that the ability to abstract information from the original context

is a sign that students will be able to apply what they have learnt in unfamiliar situations after they have graduated. This ability would mean that they had experienced cumulative learning.

I established that cumulative learning is present, but that this learning is restricted and so cannot develop to its full potential during the students' studies. This limitation is the result of a gap between the assessment questions that require context-dependent responses and those that require students to reach beyond Context 1. Students' cumulative learning is also constrained by their attempts to use higher-level knowledge principles (with weaker semantic gravity) before having mastered the lower-level ones. They are also limited by not being rewarded for using context-independent learning. Finally, cumulative learning is inhibited by too much emphasis on a knowledge code, with too little inclusion of a knower code. The balanced combination of both of these codes could help the student develop the elite code that is necessary for becoming a productive journalist after graduation.

This study gave rise to many ensuing lines of inquiry. It would be interesting to examine the role of student effort in enabling cumulative learning. It would be valuable to investigate what 'talent' is and how it is related to cumulative learning. When it comes to practical tasks, it would be relevant to study the role that aesthetic judgement plays and how it affects student learning. These issues, and many others, were beyond the scope of this research but offer promising avenues for further research into cumulative learning and its relationship to professional disciplines in general.

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