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Teacher Choices in Action: An Emergent Pedagogical Response and Intervention¹

Lee Rusznyak

Abstract Pedagogical responsiveness is both a construct to be understood and a principle to be enacted. This chapter considers how both are addressed by a module that enabled more than 44 000 South African pre-service teachers to complete their work-based learning during the coronavirus pandemic. The *Teacher Choices in Action* module emerged as a pedagogical response that supplemented work-based learning when pre-service teachers could not complete their practicum requirements in schools. The module addressed a priority need, but also responded to some long-standing concerns about the uneven quality of work-based learning experiences. To do this, the module seeks to show pre-service teachers how to look beyond visible actions and routines when observing teachers at work. If pre-service teachers are to develop pedagogically responsive teaching practices, they need to become aware of the different grounds on which teachers make choices in their lessons. This includes being responsive to the knowledge they teach, the needs of students, and the contextual realities in which they work. An important way in which teachers enact responsiveness is how they bring together complex concepts and real-world experiences in their classroom conversations and activities. The chapter discusses how semantic waves from Legitimation Code Theory are used in the *Teacher Choices in Action* module to offer pre-service teachers a principled yet responsive approach for sequencing lesson steps. The chapter argues that preparing pre-service teachers for work-based learning needs to move beyond logistics and expectations. Preparing pre-service teachers to observe and analyse teacher reasoning is crucial if they are to understand how teaching is enacted in pedagogically responsive ways.

Keywords Teacher education, Lesson planning, Pedagogical reasoning, Semantic waves, Legitimation Code Theory

Introduction

The COVID-19 pandemic created both chaos and opportunity in the education sector across the globe. During 2020, South African schools were closed for extended periods during a national lockdown. The lockdown posed an unprecedented challenge to institutions offering initial teacher education (ITE). While the work-based learning of some pre-service teachers could be rescheduled, those nearing completion were faced with the prospect of not being able to meet the requirements for qualifying. When the schools reopened, final-year pre-service teachers were permitted to undertake a school-based placement for only part of the stipulated time. Teacher education institutions faced the untenable prospect of not being able to provide all pre-service teachers with opportunities to fulfil their curriculum requirements. An urgent pedagogical response was required to replace or supplement sessions of work-based learning for pre-service teachers. Several South African teacher educators joined a “Researchers’ bootcamp” organised by JET Education Services, a non-profit organisation, which facilitates partnerships between government, professional, academic and corporate stakeholders. A challenge posed to researchers was to use the time during lockdown to address immediate and perennial concerns across the education system. Work-based learning for pre-service teachers during the pandemic was one of eleven themes tackled during the bootcamp. Under my leadership, a team of teacher educators drew on their research and experience to address enduring concerns about the quality of work-based learning for pre-service teachers. Essentially, the crisis led to an opportunity for an emergent response to “build back better”.

The *Teacher Choices in Action* module was conceptualised as a pedagogic intervention during the bootcamp and developed in the months thereafter. It offered a short-term intervention to supplement work-

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based learning during the pandemic. It was also designed to benefit the sector well beyond the pandemic. It aimed to prepare pre-service teachers for work-based learning by analysing how teachers respond to a variety of pedagogical, conceptual and contextual imperatives. During its first 20 months, more than 44 000 pre-service teachers from 24 South African universities completed the module as a supplement to their work-based learning.

This chapter first discusses concerns raised about the variable quality of pre-service teacher learning during work-based learning. The chapter then shows how the *Teacher Choices in Action* module enacts pedagogical responsiveness at three levels: First, I show why the module itself is an emergent response within a complex context. Second, I show how a resource used in the module (namely, a WhatsApp exchange between a teacher and a student) shows how a teacher's pedagogical choices respond to a complex intersection of student needs, contextual realities, and the demands of the knowledge to be taught. Third, I show how the analysis of her practice was used to introduce pre-service teachers to a principled and flexible way of understanding the sequencing of lesson steps. The chapter concludes by arguing that preparing pre-service teachers for work-based learning could usefully include a study of practice with a focus on how teachers enact pedagogic responsiveness in their lessons.

Work-Based Learning in Initial Teacher Education

Before pre-service teachers can qualify, they must spend time in schools. Ideally, practicum should familiarise them with their work as future teachers. It intends to provide them with experiences of classroom practice that can be related to the theoretical aspects of their teacher education. Despite the widespread support in the literature for work-based learning, its contribution to the professional development of pre-service teachers can vary dramatically. A prevalent concern is that practicing teachers tend to “focus more on ‘doing teaching’ rather than on explicating the associated pedagogical reasoning” to the pre-service teachers who they mentor (Berry et al., 2008, p. 1271). One reason for this is the pressure and time demands in classroom teaching. Another reason is that teachers' practices are often tacit.

Calderhead (1988) observed that although work-based learning may be a “process of self-discovery and reflection”, for some pre-service teachers it also has the potential to be an “uncoordinated trial-and-error personal experience, an exercise in modelling and imitation; an accumulation of practical tips on class management, or a cementing of pre-existing conceptions and misconceptions” (p. 78). Recent empirical research suggests that Calderhead's (1988) observation is applicable in the current South African context. Empirical research on work-based learning in the South African context reveals additional reasons why some pre-service teachers return to university enriched by their work-based experiences, while others benefit little:

- Studies report on high levels of teacher absenteeism when pre-service teachers arrive (Moodley et al., 2018). Left in classrooms, largely to their own devices, pre-service teachers need to figure out their lessons with little guidance and receive minimal feedback on their attempts at teaching (Rusznyak & Walton, 2017).
- Studies of classroom teaching in South Africa show that lessons continue to offer a series of disconnected activities that keep students busy but have little conceptual depth or connection between them (Hoadley, 2017; Naidoo & Mabaso, 2020).
- Some lesson planning requirements are mere templates that focus on routine issues and recorded lesson steps. These do not prompt pre-service teachers to justify their design of learning pathways (Rusznyak & Walton, 2011).
- Guidelines that prompt pre-service teachers to reflect on their teaching tend to direct their attention to observable aspects of classroom activity. When they reflect on how their lesson went and how it may be improved, their focus is directed entirely towards their experiential learning. Seldom do these prompts ask pre-service teachers to think of how insights from their university coursework may help them make sense of critical incidents in the classroom (Rusznyak, forthcoming). In addition, few formal opportunities exist for pre-service teachers to consider how their experiences extend or challenge what they learn in university-based coursework (Walton & Rusznyak, 2019).
- Assessment rubrics that contain atomistic criteria in the form of checklists, promote a fragmented approach to teaching (Rusznyak & Bertram, 2015). Pre-service teachers may score highly when lessons include the desired components, regardless of whether that strategy is inappropriate for the content taught.

- Vaguely defined levels of achievement, such as *excellent* or *very good*, obscure messages about what pre-service teachers are doing well, what they could be doing better and how they could improve (Rusznyak, 2011).
- An analysis of the conceptions of teaching held by pre-service teachers revealed that most underestimated the complexities of how teachers work to organise knowledge. At first, many understand teaching as a straightforward role of dispensing information and motivating and caring for students during school hours (Rusznyak & Walton, 2014). It is not always easy for pre-service teachers to observe and understand the knowledge-building work teachers do in their subjects.
- Borello's (2019) study revealed that even in a well-established, structured South African internship programme, most interactions between teacher mentors and pre-service teachers imparted classroom tips, such as not using a green marker on a white board. Very few opportunities were created in which mentor teachers made their pedagogical reasoning explicit to pre-service teachers. And very few opportunities were given to pre-service teachers to explain what they were doing and why. The pre-service teachers acquired some craft knowledge but little insight into the reasons why teachers choose some pedagogic options above others.

Literature reviewed suggests that some pre-service teachers focus their classroom observations on students' activity and their participation. Others tend to focus on its most visible parts of teachers' work: how they interact with students, the resources they use, and how they manage their classroom routines. As important as these aspects of teachers' work are, more is needed to prepare pre-service teachers for work-based learning. Less obvious are the ways teachers consider a range of factors in the pedagogical choices they make. These include the learning needs of diverse students in the class, what achievement in the subject looks like, and the contextual realities in which teachers work.

The crisis in the education system caused by the pandemic created an opportunity to address some of these prevalent concerns. The *Teacher Choices in Action* module was designed to enable pre-service teachers to observe and analyse the reasoning that informs teachers' work. This enables students to consider how teachers need to be responsive to multiple priorities in their lessons. These priorities include the subject and content knowledge of the lesson, subject-specific pedagogies, the learning needs of diverse students, the imperatives for inclusive education, and prevailing contextual factors.

Seeing Pedagogical Responsiveness in Teachers' Work

To understand pedagogical responsiveness, pre-service teachers need to become aware of how different kinds of knowledge inform the decisions teachers make in their classroom work. Pedagogical responsiveness requires attention to the subject knowledge, knowledge of students' learning needs, as well as knowledge about the context in which students live. Ignoring students' learning needs, personal experiences and contextual realities can leave them feeling alienated from learning. In such cases, content knowledge may seem remote, irrelevant and inaccessible (Samuel, 2009). Equally, ignoring the nature of the subject knowledge can mean that lessons keep students busy but do not lead to specialised knowledge and ways of thinking and expression offered by the subject.

Shulman (1987) insisted that to understand teachers' work, one must "give careful attention not only to the management of students in classrooms, but also to the management of ideas" and how this affects teachers' reasoning in practice (p. 1). To draw attention to the importance of managing ideas, Shulman defined a unique professional knowledge of teachers, which he called pedagogical content knowledge (PCK). He described it as a "blending of content and pedagogy into an understanding of how particular topics, problems or issues are organised and presented for instruction" (Shulman, 1987, p. 8). A large body of scholarship into PCK has formed in support of Shulman's (1987) insistence that the knowledge to be taught and learned should inform pedagogical decision-making. While being a powerful construct for understanding the knowledge base of teaching, PCK cannot be observed directly. Its effects may be visible in how teachers work with concepts, and how they organise their students' engagement with concepts during the lesson. A crucial part of pedagogical responsiveness is that of how knowledge informs teachers' decision-making in practice.

Knowledge is structured differently in subjects. What counts as the basis of achievement changes from one subject to another, and between topics within a subject. Ignoring these differences treats forms of knowledge as if they are "identical, homogenous and neutral" without internal powers of their own (Maton,

2014, p. 2). School-based learning often enables students to understand how particular examples or experiences form part of more generalised patterns of social or natural phenomena are. Subject knowledge, including mathematics and the natural sciences, often build knowledge inductively by looking at examples and finding patterns or relationships that can be generalised into rules or laws. These subjects recognise students' achievements through their mastery of concepts, their understanding of how the concepts connect to theories, and their ability to use these ideas to explain and predict real-world phenomena. Some subjects and topics, including accounting, grammar and titrations in chemistry, require that students master sets of rules or protocols that must be enacted in precise ways. Some topics, particularly those in the creative arts, literature and history, regularly seek to enable students to understand what makes specific artefacts, events or cases distinctive or worthy of attention. Some topics in these subjects also value how students use specialised knowledge to express themselves in creative, critical or inquiry-based ways.

It's not just the information or concepts that distinguish one subject from another. It is also whether mastery involves abstracting ideas, learning to position oneself in a debate, or expressing oneself in systematised ways (Maton, 2014; Bernstein, 2000). Although teaching strategies are often presented to pre-service teachers as if they can be used irrespective of the subject knowledge (e.g., Criticos et al., 2009; Killen, 2007), this is not the case. The appropriateness of teachers' pedagogical choices is fundamentally determined by the subject knowledge and purpose of the lesson.

Teacher Choices in Action: An Emergent Pedagogical Response

When *learning-in-practice* became impossible because of the COVID-19 restrictions, a *learning-from-practice* approach to work-based learning provided a way of offering a worthwhile alternative to school-based placements (Rusznayak & Bertram, 2021). A team of teacher educators, drawn from different South African universities, developed an online module, called *Teacher Choices in Action*. This module can be used by any higher education institution to supplement reduced or postponed practicum sessions. This initiative can be understood as an emergence within a complex system. Emergence is a concept in complexity theory and refers to new norms, patterns, behaviours, or structures that result when a system becomes sufficiently complex (Lichtenstein, 2015). Emergent phenomena represent more than an adjustment in the system, but rather a break from trajectories into which existing systems may be locked. In South Africa, the confluence of pandemic conditions, the need for work-based learning reform in teacher preparation, and the availability of experienced and research-active teacher educators enabled the emergence of a module that would not have been possible outside the crisis and the opportunities created in this complex context.

The *Teacher Choices in Action* module addresses long-standing concerns about the uneven quality of work-based learning. One of the concerns is that work-based learning is not always as beneficial as it could be. The preparation of pre-service teachers for school placements often focuses more on logistical aspects of placement arrangements and to ensure that pre-service teachers are briefed in terms of record-keeping and conduct expectations. Much less attention is often paid to preparing them for observing and analysing parts of teachers' practices that were generally hidden from them as students.

The module is organised around the key decisions that all teachers need to make in every lesson they teach (Hugo, 2013). The module draws the attention of pre-service teachers to the ways teachers work with subject knowledge, education theory and student diversities in their school contexts:

1. On choosing to become a teacher.
2. Teacher choices in different contexts.
3. Teacher choices that work with knowledge.
4. Teacher choices that promote cumulative learning.
5. Teacher choices for inclusive teaching.
6. Teacher choices to manage learning environments.

Through theoretically informed approaches, the module introduces pre-service teachers to the idea that pedagogical responsiveness is fundamental to effective teaching. Using a range of resources, including recorded lessons, pre-service teachers are shown the different choices teachers can make. This considers the reasons for the teachers' lesson design given the purpose of the lesson, the learning needs of students and the contextual realities in which the teacher works. Pre-service teachers watch recorded lessons and analyse the choices teachers made in how they work with concepts, and engage students in discussion, learning activities

and assessment tasks. By looking at the same choices in different contexts, subject areas and student groups, pre-service teachers see a far greater range of practices than possible through an extended placement in one school setting. Through analysing teachers' options and choices, pre-service teachers learn why some pedagogical approaches are more appropriate in some lessons or contexts than in others. The module thus supplements work-based learning and extends the mentoring that should ideally take place when pre-service teachers work alongside teachers who give account of their practices. In this way, pre-service teachers become more aware of the value in considering the reasoning that informs teachers' actions when they observe lessons.

One of the resources that was used in the *Teacher Choices in Action* module was a text exchange between a Grade 8 student and his mathematics teacher, Ms Flanagan. Her interaction with him was designed to help him understand the relationship between profit, income and expenditure in a lesson in which the concepts in financial maths are introduced (see Figure 7.1).

In the sections that follow, I show how this WhatsApp exchange was used to show pre-service teachers how a teacher considered a student's needs and contextual possibilities, while working with concepts in pedagogically responsive ways.

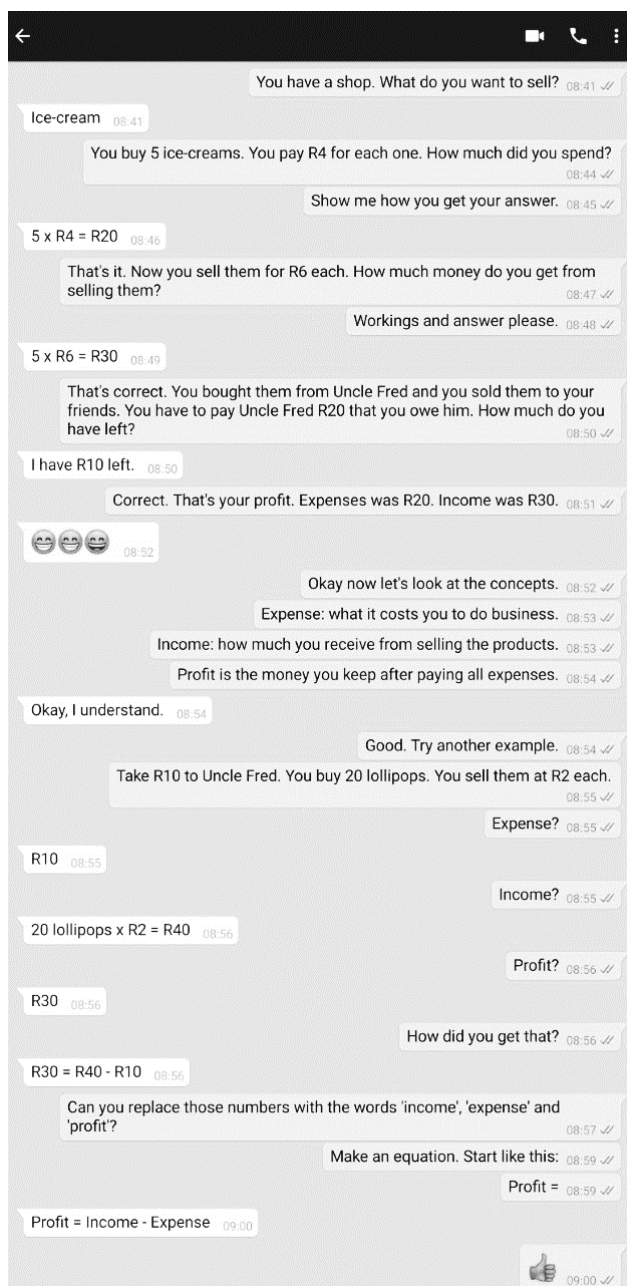


Fig. 0.1. WhatsApp conversation between Ms Flanagan and a student, used as a resource in the *Teacher Choices in Action* module (reproduced from Rusznyak, 2020)

Pedagogical Responsiveness to Contextual Realities

In the *Teacher Choices in Action* module pre-service teachers consider how schooling contexts provide challenges and opportunities for modes of lesson delivery. During the module, pre-service teachers consider how various teachers adjusted their mode of delivery and pedagogies to deliver on their teaching obligations. The WhatsApp exchange between Ms Flanagan and her student was used to demonstrate one pedagogically responsive mode of curriculum delivery.

In 2020, when South African schools were closed during the COVID-19 national lockdown, online learning continued in some independent schools in more affluent communities. However, online learning was almost impossible for schools in more disadvantaged communities where only a few students had access to computer facilities at home, and even fewer had reliable internet access. Teaching and learning have virtually come to a standstill in these communities. Aside from the disruption to the curriculum, teachers like Ms Flanagan were concerned about losing connection with their students. Some teachers continued to stay in touch with their students through whatever means possible. Text messaging through WhatsApp proved to be a reliable and affordable way through which Ms Flanagan could maintain contact with the students in her classes. Through communicating with students to check on their well-being, Ms Flanagan soon came to realise that the students were not only feeling isolated but had very little to do. Ms Flanagan considered how she could continue to provide instruction during lockdown. She made short recordings where visual support of explanations would enhance understanding. For example, she used a handful of beans to help students visualise the connection between mathematical notation and what multiplying a whole number by a fraction means in real terms. She shared these short clips via WhatsApp to support her explanations. Students could access instruction through their available devices and in ways that were accessible and light on data charges. She also interacted with students one-on-one through WhatsApp where necessary.

Pedagogical Responsiveness to Learning Needs of Students

Ms Flanagan taught mathematics to a class of South African students who were all about 14 years old, and in their first year of secondary school. The school uses English as the language of learning and teaching, despite most students speaking different languages at home. Students in her class had come from different primary schools and there were large differences in the English reading and comprehension proficiency among them. The student who participated in the WhatsApp learning chat is one whose reading was still at a very elementary level and who had not participated much in classroom discussions. Ms Flanagan felt that there would be few opportunities for students like him to read and write during lockdown, so she decided to communicate as much as possible with him individually through short text messages.

The exchange reproduced in Figure 7.1 was one of many in which she continued interacting with the students through text messaging. A transcript of her interactions shows how she invited him to connect personally with a simple word problem. She then led him to a deeper understanding of the concepts *profit*, *income* and *expenditure* and the relationship between them.

Pedagogical Responsiveness in Knowledge-Building

A key question addressed in the *Teacher Choices in Action* module is how teachers work with knowledge. It is often easier for pre-service teachers to notice student activities and classroom routines, than to notice how teachers manage ideas in their lessons. Although knowledge-building can be difficult to see, it is crucial if pre-service teachers are to develop pedagogically responsive teaching practices.

The *Teacher Choices in Action* module uses semantic profiles to show pre-service teachers how teachers work with knowledge in pedagogically responsive ways. Semantic profiles form part of the analytic toolkit in Legitimation Code Theory (LCT). LCT provides a sophisticated framework for analysing and informing social practices (Maton, 2014). Its conceptual tools have been widely used to study knowledge practices across the disciplinary map, and at all levels of education systems. Semantic profiles are graphical representations that show how meaning shifts between simpler, more context-dependent forms of knowledge (such as examples from the lived experiences of students), and those that are more transferable and complex (such as concepts or procedures to be taught and learned) (Maton, 2013). These shifts can be analysed over time (such as lessons or conversation) or text (such as stories or essays) (e.g., Maton, 2013; Macnaught, 2020; Wilmot, 2020).

Two relations reveal these shifts:

- The first, semantic gravity (SG), considers the extent to which meaning is tied to a specific context. Personal experiences and real-world examples are fixed in space and time and have stronger semantic gravity (notated as SG+ at the bottom of the semantic profile). A concept, like *profit* for example, can be used across different contexts. It therefore has weaker semantic gravity (notated as SG-, at the top of the semantic profile). The semantic gravity strengthens when the WhatsApp exchange considers an example of buying ice-cream from Uncle Fred.
- The second, semantic density (SD), considers the complexity of meaning (Maton, 2014). When these are laden with meanings and form part of a greater network of meaning, they have a stronger semantic density (notated as SD+ at the top of the semantic profile). Weaker semantic density describes aspects of social practices (e.g., words, symbols, concepts) that are simpler, either because there are fewer meanings attributed to them or they can be understood on their own terms. For example, the phrase “what you owe” is simpler than the term *expenditure*, which has a more technical meaning in the field of financial mathematics. Its semantic density strengthens even more when it is brought into a mathematical relationship with other concepts like income and profit.

Semantic profiles are extremely useful in drawing pre-service teachers’ attention to how teachers manage ideas in their lessons. Cumulative knowledge-building is characterised by semantic waves that shift between relevant examples and abstract concepts that can be transferred across contexts (Maton, 2013). *Semantic waves* are a particular kind of profile that contain both upshifts (moves towards complex, transferable concepts) and downshifts (towards real-world experiences and examples). Semantic waves can be seen during the unfolding of learning pathways in lessons; in classroom conversations (Martin et al., 2010); through explanations and tasks in textbooks (Maton, 2013); in student responses to learning activities (Szenes et al., 2015); and in the demands of assessment tasks (Blackie, 2014).

The learning pathway which Ms Flanagan set out in the WhatsApp chat builds knowledge by using a semantic wave that moves back and forth between simpler examples and more complex concepts, as illustrated in Figure 7.2.

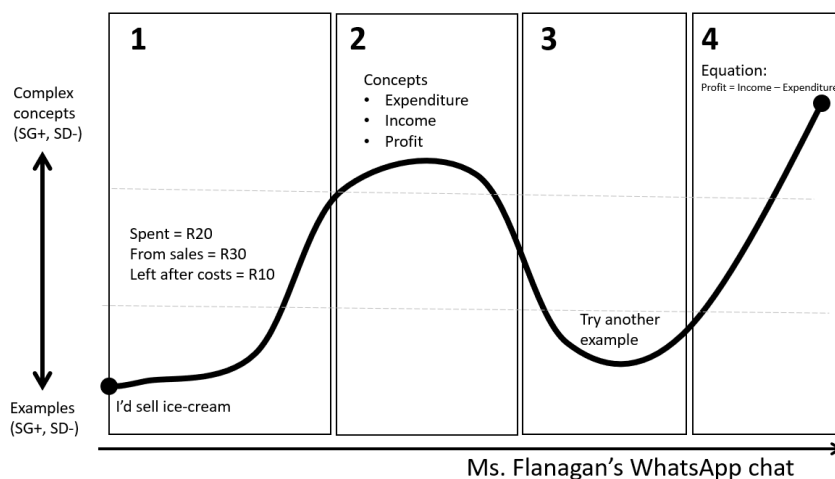


Fig. 0.2. Semantic wave showing shifts in the strength of SG and SD in Ms Flanagan’s WhatsApp chat with a Grade 8 student

Four distinct stages in the learning process can be identified:

Step 1 Ms Flanagan begins her design of the learning process using a simple question. The question invites the student to imagine a real-world situation (a stronger semantic gravity, SG+). She asks what he would sell if he set up a store. The question is about personal preferences and has no mathematical terminology or symbols (a weaker semantic density, SD-). The student's choice of goods to sell invites him to solve a mathematics problem that she starts to construct. The semantic wave of the learning process begins from a *lower point on the semantic profile*.

The lesson uses a hypothetical example to introduce concepts that make more complex forms of knowledge. By working through the example, the teacher starts to build up concepts related to financial mathematics. She uses everyday (non-mathematical) language, simple words and short instructions, such as: "Workings and answer please." Most of her exchanges have less than seven words. She keeps the language accessible to enable the student to focus on understanding the mathematical content. Ms Flanagan uses a range of carefully selected questions to guide the student to a situated understanding of money spent, earned, and owed. Through questions and responses, the meaning shifts towards a more complex, abstract form of knowledge. This shift is represented in the semantic profile as the wave moves *upwards*, as it becomes less dependent on a real-world context (semantic gravity weakens) and the knowledge takes a more complex form (semantic density strengthens).

Step 2 At the higher part of the semantic wave, Ms Flanagan introduces three concepts using more specialist terminology: profit, income, and expenditure. The knowledge has now been abstracted from the context of selling ice-cream. Ms Flanagan has shifted the focus from a hypothetical example to unfamiliar concepts that are now becoming more familiar and understandable to the student. Ms Flanagan no longer refers to the illustrative example of selling ice-cream. She has extracted meaning from the example to offer a generalised understanding of these concepts to the student.

Step 3 Ms Flanagan now uses these concepts and presents the student with a different example. The semantic wave takes a downward shift as she directs the focus of the lesson back towards a different hypothetical example. This time, she does not use ordinary everyday words. She now uses more technical names of concepts and no longer needs to elaborate on their meaning. The greater complexity in these interactions means this step has a stronger semantic density than those in Step 1. At this point in the conversation, the student works with instructions using subject terminology and his responses demonstrate an understanding of the concepts and how they are applied in an empirical situation.

Step 4 For students to build their understanding of the knowledge into a more complex form, the semantic wave should shift upwards again. For this topic, this means to understand the relationships between profit, income and expenditure. Ms Flanagan asks the student to further consolidate his new conceptual understanding by connecting the three concepts into a generalised mathematical equation.

Each of the steps builds on a preceding one and provides a foundation for what comes next. Through the analysis of this interaction, pre-service teachers see how Ms Flanagan shows a responsiveness to the context in which she works and also to the knowledge-building demands of the lesson. She moves from a hypothetical situation to introducing concepts and helping the student see links between them.

Throughout this interaction, Ms Flanagan asks direct questions and checks the student's understanding. Her feedback responses, "Correct" or "That's right" are appropriate in this kind of lesson where concepts are introduced, applied and connected. The student would now be ready to solve other problems with these concepts having established their meaning, tried them out and seen the connection between them.

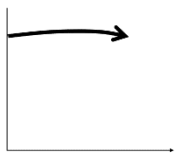
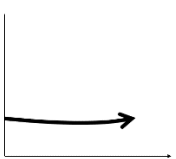
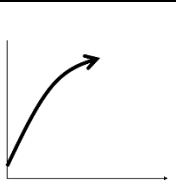
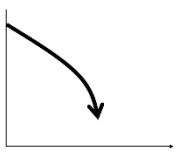
Using Semantic Waves for Lesson Planning

The *Teacher Choices in Action* module used semantic profiles to draw the attention of pre-service teachers to how teachers manage knowledge in the lessons they teach. In addition to Ms Flanagan's WhatsApp chat, the module introduced them to many other differently structured lessons, across a range of subjects, grade levels and school contexts. The module guided the pre-service teachers in constructing semantic profiles for a

number of observed lessons. They consider why a particular combination of upshifts, downshifts and high and low flatlines would be appropriate for the lesson observed. This strategy was used to prompt pre-service teachers to look out for the conceptual moves in a sequence of lesson steps.

Differently shaped semantic profiles can be constructed from combining four constituent parts, summarised in Table 7.1. Each part reflects a different way in which meaning shifts over time.

Table 0.1. Constituent parts of semantic profiles (adapted from Maton, 2013)

Flatlines	<i>High</i>		Focus is on abstracted theory, principles, complex concepts and/or procedures that can be transferred across contexts. Meaning has a relatively weaker semantic gravity (SG-) and stronger semantic density (SD+).
	<i>Low</i>		Focus on personal experience and/or real-world examples or case studies. Meaning has a relatively stronger gravity (SG+) and weaker semantic density (SD-).
Shifts	<i>Upward</i>		Meaning shifts from simpler, context-dependent to that which are more transferable between contexts and more complex. Semantic gravity is weakening (SG↓) and semantic density is strengthening (SD↑).
	<i>Downward</i>		Meaning shifts from more complex concepts to simpler more context-dependent meanings, such as those tied to personal experiences or real-world examples. Semantic gravity is strengthening (SG↑) and semantic density is weakening (SD↓).

Semantic profiles offered the *Teacher Choices in Action* module a visual way of introducing pre-service teachers to the logics of sequencing lesson steps. Differently shaped semantic profiles can be used to consider what combination of upshifts, downshifts and high and low flatlines would be appropriate for the knowledge itself and the purpose of the pedagogical activity (Maton, 2020). Designing coherent learning pathways over time requires a teacher to recruit knowledge and make a whole series of choices (Rusznyak & Bertram, 2021). For example, the shape of the semantic wave reflects choices that teachers make about how they start and end the lesson; how and when they draw on examples from students' lived experiences; when they introduce and develop concepts, and when they provide students with opportunities to apply what they have learned. All these decisions must be responsive to both the nature of the lesson's content knowledge, the students' context and their learning needs.

Seeing differently shaped semantic profiles enacted in a range of lessons, the *Teacher Choices in Action* module introduced pre-service teachers to the idea that semantic waves can provide a conceptually principled way of thinking about the sequencing of lesson steps. It moves lesson planning beyond being perceived as an administrative task of completing paperwork required by the university. It also ensures that lesson planning is not merely packing the time with enough activity to keep students busy.

One kind of semantic wave already discussed was illustrated by the WhatsApp interactions between Ms Flanagan and her students. It starts with a teacher introducing examples or inviting students to share personal experiences or perspectives (see Fig. 7.3). If the concept is one in which some but not all students have personal experience on which to draw, the teacher may choose a suitable example, story or case study as a shared resource for students. The pedagogic work of the teacher draws students' attention to important aspects of the experiences or examples that reveal significant patterns or attributes. As the focus moved from the examples to their attributes or patterns, the knowledge becomes less context-dependent (weakening semantic gravity) and more complex as concepts are introduced and the relationships between them explored (strengthening semantic density).

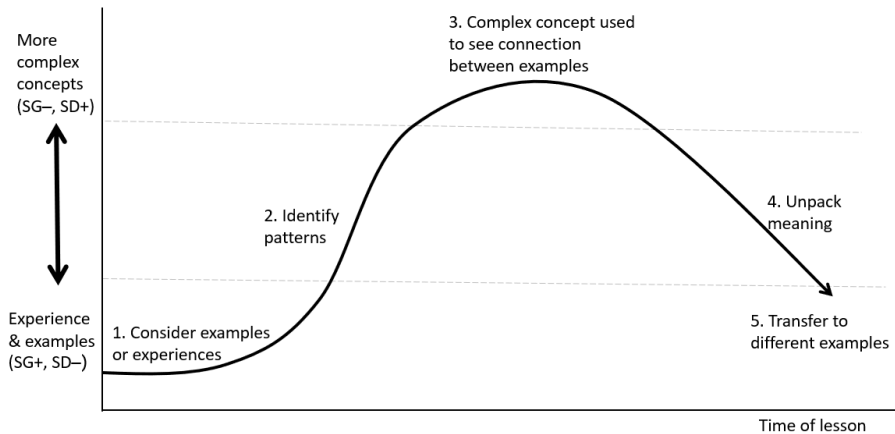


Fig. 0.3. Semantic wave showing how semantic gravity and semantic density may shift when lessons start with examples or student experience (adapted from Maton, 2020)

By way of contrast, a teacher may know that students hold many misunderstandings about the concept which need clarification. She may decide to start the lesson by introducing a concept with a definition and explanation unrelated to their prior knowledge or real-world experiences. In such a case, the semantic wave starts higher on the profile, with complex concepts and relationships between them (SG⁻, SD⁺). The teacher needs to consider how long to keep the lesson at a high semantic flatline. If there is not yet a shared understanding of the concepts, teachers will need to shift knowledge to a lower point on the semantic wave. This could be through explaining technical words in more everyday language, or breaking a whole into constituent parts (weakening semantic density). It could be by giving examples or using experiences familiar to students (strengthening semantic gravity). Once the knowledge is more simply put and tied to context, the next question for the teacher becomes what learning tasks or instruction would enable students to repack the knowledge into more complex forms again.

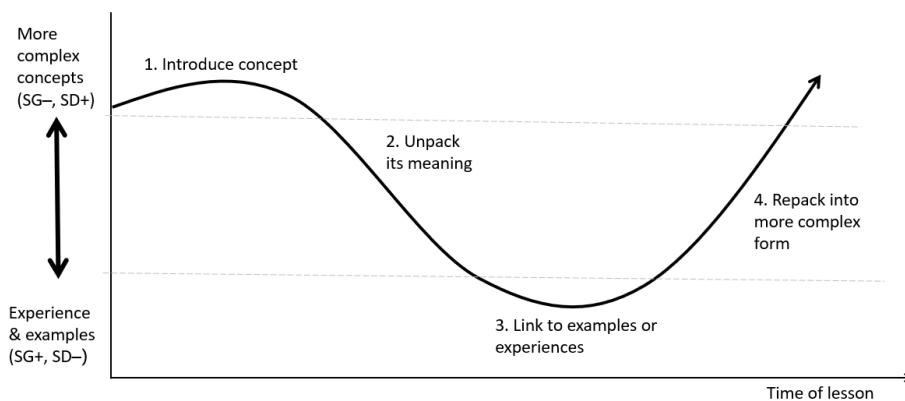


Fig. 0.4. Semantic wave showing how semantic gravity and semantic density may shift in a lesson that starts by introducing students to a complex concept (adapted from Maton, 2020)

Semantic profiles can also be used to prompt teachers to consider whether lesson design is fit for purpose (Maton, 2020). In the section that follows, I discuss three other kinds of semantic profiles (as low flatlines, high flatlines and a series of downshifts in Fig. 7.5 to 7.7), which may be ideal for some pedagogical purposes but would constrain learning in others.

There may be very good reasons why teachers choose to spend extended lesson time encouraging students to discuss their experiences or contribute familiar examples related to the lesson topic. A low flatline (as shown in Fig. 7.5) makes learning relevant and engaging. But staying at a low flatline for extensive periods of time without ever taking upward shifts could mean that students would not learn to think about what they know in more complex ways. Research has shown that all too often, lessons can remain simple and experiential (SG⁺, SD⁻) where students' existing knowledge is pooled with few new insights added. Familiar

ideas are not extended, unfamiliar attributes and relationships are not explored, and taken-for-granted assumptions are not challenged.

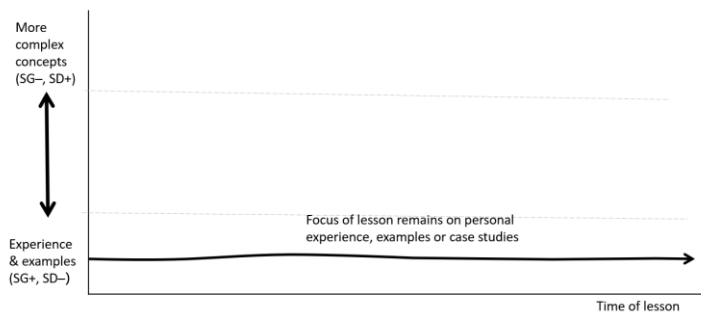


Fig. 0.5. Semantic profile showing a low flatline over time (adapted from Maton, 2020)

If teachers use only complex concepts in their lessons, learning can be disconnected from relevant examples and students' lived experiences (SG-, SD+). A high flatline (the semantic profile shown in Fig. 7.6) could be a highly appropriate semantic profile to use during revision lessons when students already understand concepts, technical terms and the pedagogical purpose is to revise and consolidate ideas. If a high flatline is used to introduce unfamiliar concepts, it is likely that students find themselves alienated from knowledge and marginalised within the pedagogic space. For those who already understand the concepts and discourse, there is little concern. However, for those who do not yet understand the concepts and discourse, and how they manifest in the real world, the technical language used to work with specialised ideas can be impenetrable.

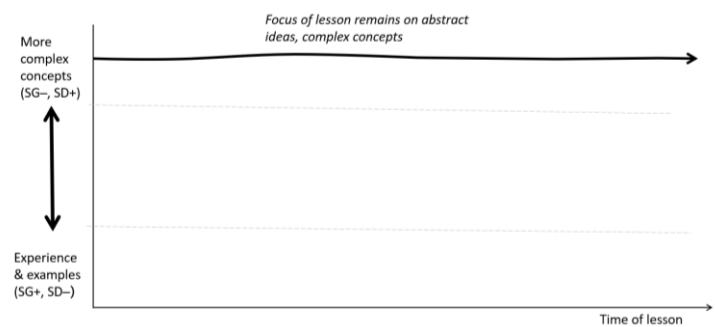


Fig. 0.6. Semantic profile showing a high flatline over time (adapted from Maton, 2020)

Designing the steps of a lesson as a series of downshifts (see Fig. 7.7) may be highly appropriate when going through a list of definitions or a marking memo after an assessment. However, this shape of semantic profile would be wholly inappropriate over an entire series of lessons. Students' learning would be segmental in nature (Maton, 2013). They would emerge by understanding a cluster of concepts. However, they would not know how the concepts are connected nor how they yield insights into physical or social phenomena.

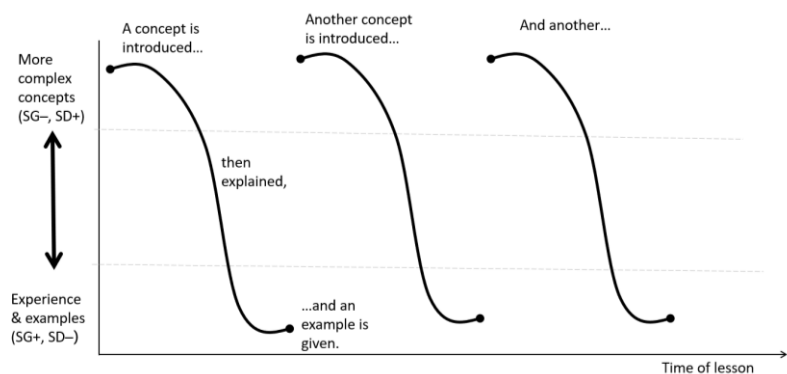


Fig. 0.7. Semantic profile showing a series of downshifts (adapted from Maton, 2020)

The use of semantic profiles to analyse and plan lessons can be considered at different time scales, such as over a series of lessons. The semantic wave of a single interaction or task can be analysed in terms of the extent to which its focus shifts between conceptual knowledge and real-world examples. Ms Flanagan's WhatsApp conversation is an example of a semantic wave in a very brief one-on-one pedagogic interaction (see Fig. 7.5). At other times, students analysed semantic waves over an hour-long lesson. Dips in the profile to context-bound experience or examples may range from a quick mention of an exemplar or a simple illustrative anecdote in an explanation, to an entire lesson focused on a case study.

Research from studies, including the Disciplinarity, Knowledge and Schooling (DISKS) Project (see Macnaught et al., 2013), suggests that cumulative knowledge-building is characterised by shifting back and forth between context-bound and abstracted forms of knowledge. Over an extended sequence of lessons, semantic waves tend to reach increasingly higher levels of complexity, as illustrated in Fig. 7.8.

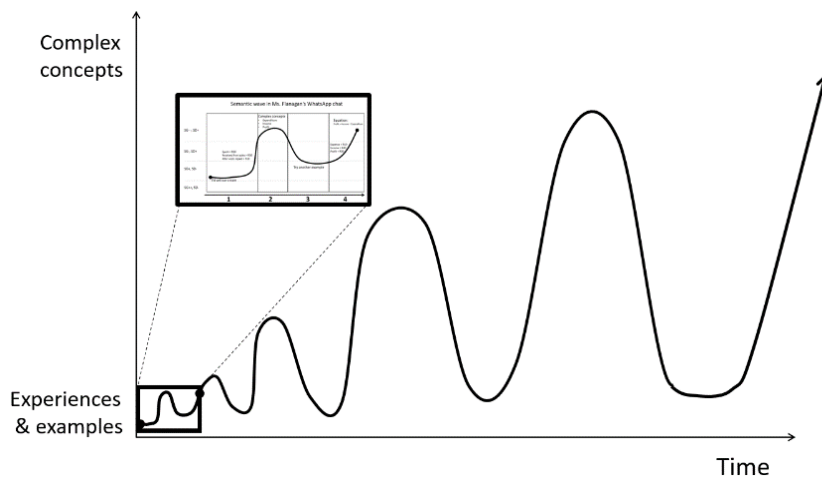


Fig. 0.8. In extended learning programme, semantic waves reach increasingly higher levels of abstraction and complexity over time (adapted from Maton, 2020)

Preparing Pre-Service Teachers for Work-Based Learning

All too often preparing pre-service teachers for work-based learning focuses on the logistical arrangements and conduct expectations. It is easy to assume that observing teachers' work is straightforward for pre-service teachers. After all, they have spent more than 12 years in schooling, and the classroom is a familiar environment. However, for work-based learning to be of real benefit, pre-service teachers should observe teaching practices in ways they have not done before. The *Teacher Choices in Action* module supplements pre-service teacher preparation for work-based learning by helping them think about the reasoning that informs how teachers work.

The module alerts pre-service teachers to the pedagogical responsiveness in teachers' work in several ways:

First, the module introduces pre-service teachers to key choices that all teachers make in every lesson they teach. One such question is how teachers manage ideas in their lessons and the sequence of knowledge-building activities. Understanding key issues around which pedagogical choices are required introduces pre-service teachers to understanding teaching as a principled practice that is enacted in contextually responsive ways.

Second, the module introduces pre-service teachers to a range of concepts that help them analyse the choices that teachers make in practice (Rusznyak & Bertram, 2021; Shalem & Slonimsky, 2014). The *Teacher Choices in Action* module uses semantic profiles from LCT as part of a "language and structure for describing practice" that Grossman et al. (2009, p. 2075) insist is necessary if novices are to understand teaching. Semantic waves not only draw pre-service teachers' attention to the knowledge-building work that teachers do, they also provide a principled yet flexible way for pre-service teachers to understand how lesson steps can be sequenced.

Third, the module guides pre-service teachers as they analyse teachers' pedagogical choices in exemplar lessons. The module, for example, draws their attention to how these choices have been responsive to the subject knowledge, as well as students' learning needs and the contextual realities. Watching a range of lessons gives pre-service teachers opportunities to analyse how particular pedagogic choices are enacted by teachers across differing contexts.

Fourth, the module offers pre-service teachers a large "library" of recorded lessons. Over the module, pre-service teachers observe a range of lessons relevant to their subject and grade specialisation. Tasks let them think about how concepts from the module, like semantic waves, manifest in the lessons they observe. They are also asked to write lesson observation reports in which they consider how the teachers have been responsive to what, who and where they teach. Through the module, pre-service teachers move from undertaking a guided lesson analysis to structured lesson observation to independent analysis of teachers' thinking in action.

Conclusion

Work-based learning should give pre-service teachers experience of classroom life as a teacher. It also provides opportunities for them to understand teachers' work in context. However, research suggests that pre-service teachers sometimes accumulate classroom experience during work-based learning but do not always develop more nuanced insights into teaching expertise. This is particularly the case if they focus only on classroom activities, without thinking about the many choices that teachers make as they organise students and manage ideas. There seems to be value in offering coursework that prepares pre-service teachers for observing the less noticeable parts of teachers' work.

The COVID-19 lockdown provided the impetus and opportunity for South African teacher educators to address some concerns about the quality of work-based learning and address these gaps. The *Teacher Choices in Action* module used a learning-from-practice approach to prompt pre-service teachers to think about the choices teachers make in their classroom practices. Understanding the rationale for teachers' actions is important if pre-service teachers are to understand teaching as a complex, principled but pedagogically and contextually responsive practice. They also need to understand the choices teachers make if they are to develop pedagogically responsive practices themselves.

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