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Lesson planning guidelines for student teachers: A scaffold for the development of pedagogical content knowledge

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Abstract

Lesson planning for student teachers is often regarded in technical terms, merely as the means to ensure effective classroom performance. This approach limits the possibilities that the process of lesson planning offers to the development of professional competence among student teachers. In particular, student teachers need to begin to develop their pedagogical content knowledge (PCK), the capacity to make pedagogical choices that are logically derived from content and contextual knowledge. This article reports on a Lesson Planning Guideline which is used to scaffold the construction of student teachers' PCK individually by requiring them to consider the constituent parts of PCK individually and in relation to one another during the planning process. This guideline was developed in response to perceived limitations of existing guidelines used in our institution and found in texts for student teachers. Called a "Rationale for lesson design" the Guideline does not attempt to simplify the planning process, but rather enables students systematically to access the complexities inherent in effective lesson preparation. By requiring students to articulate their content knowledge and narrate their pedagogical reasoning in some detail, the Guideline enables students not only to teach with confidence but also to construct PCK.

Key words: lesson planning, pedagogical content knowledge, scaffold, student teacher, learning to teach, practical teaching

Introduction

In planning a sequence of lesson steps, one of our beginning student teachers writes, "*I will start off by asking [the learners] what photosynthesis is and explain the word. I will then hand them the notes that I have compiled from the internet to read. They will answer questions*". This common tendency for student teachers quickly to lapse into a description of classroom procedures in their lesson planning is developmentally understandable. Research shows a prevalent tendency for student teachers initially to underestimate the conceptual complexity of teaching, seeing the most visible routines as the essence of the practice itself (Hammerness, Darling-Hammond, Bransford, Berliner, Cochran-Smith, McDonald and Zeichner 2005; Joram and Gabriele 1998; Lochran, Mulhall and Berry 2008; Rusznyak 2009). Their immediate concerns are often directed towards learning to manage classrooms and learners (Darling-Hammon 2006; Fuller and Brown 1975; Hammerness et al. 2005; Kagan 1992). Planning coherent learning opportunities is therefore "not something that most people know how to do intuitively or that they learn from unguided classroom experience" (Darling-Hammond, Banks, Zumwalt, Gomez, Sherin, Griesdorn and Finn 2005:176). Without targeted intervention, sessions of practical teaching can easily be reduced to an attempt to accumulate teaching tips on generic teaching strategies and classroom management routines and procedures (Calderhead and Shorrock 1997; Joram and Gabriele 1998). An important part of initial teacher education therefore involves introducing student teachers to the complexities involved in planning conceptually sound, coherently thought-out lessons, and providing opportunities for them to practise doing so (Richardson 2005:110).

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Prior to the commencement of their practicum sessions, student teachers are generally introduced to and guided in a particular approach to lesson planning. They are usually given some kind of structure, format or template that they would use as they begin to observe, prepare and deliver lessons (Tyler 1949; John 2006). We have, for ease of reference, called this a lesson planning guideline. During their initial teacher education programme, student teachers use these lesson planning guidelines repeatedly in relation to different lesson topics within several classroom contexts over an extended period of time. The design of such lesson planning guidelines therefore has a crucial role to play in enabling student teachers to access the inner logic of planning for teaching.

There is, however, an inherent danger since, in seeking to simplify lesson planning for ease of use by student teachers, lesson planning guidelines may present lesson planning as an overly simplistic process (John 2006), reinforcing student teachers' initial conceptions of the teaching as the outward manifestation of classroom procedures. The challenge then is for lesson planning guidelines to be accessible to beginning student teachers, without compromising the complexities that reveal the inner logic of lesson coherence to them. Such a balance can be achieved through a scaffolding process which provides novices with a temporary support that enables them to "carry out a task or achieve a goal that would be beyond his [or her] unassisted efforts" (Wood, Bruner and Ross 1976:90). While the need for student teachers to prepare their lessons is widely recognised as an essential part of learning to teach, *how* the students are taught to approach their lesson preparation has the potential to scaffold their construction of pedagogical content knowledge (PCK), thereby enhancing their understanding of lesson planning as a complex practice.

Scaffolding student teachers' construction of PCK

Pedagogical content knowledge (PCK) is defined as the blending of content knowledge, knowledge of learners and their context and general pedagogical knowledge into representations that are "pedagogically powerful and yet adaptive to the variations in ability and background presented by [learners]" (Shulman 1987b:102). Shulman (1986) noticed that the focus of research into effective teaching had, at that time, largely ignored the "management of ideas" (Shulman 1987a:84) and the "central aspect of classroom life, the subject matter" (Shulman 1986:194). In introducing the concept of PCK, Shulman rejected a conception of teaching as an applied craft with a content-independent set of generic skills, for one in which the teacher makes pedagogically reasoned choices which are considered in relation to the content knowledge to be learnt, needs of learners and the context in which learning takes place.

An important professional goal of teacher education is that student teachers develop the "capacity to plan instruction so that it meets the needs of [learners] and the demands of content" (Darling-Hammond et al. 2005:176). Such a capacity depends on a construction of their PCK. Although PCK is regarded as an "accepted academic construct", few examples of PCK have emerged in the research on knowledge for teaching (Berry, Loughran and Van Driel 2008:1272). Several reasons offered in the literature explain why PCK is elusive and therefore difficult explicitly to teach to student teachers. First, the teacher knowledge that informs practice is usually tacit, and research has shown that teachers seldom possess a shared language of description in which to discuss their practice (Carter 1993). Second, as the demands of student achievement and curricula tend to "create a focus on 'doing teaching' rather than explicating the associated pedagogical reasoning", teachers seldom have the time needed to reflect on their practice (Berry et al. 2008:1271). Third, PCK is thought to be difficult to articulate because it is often tightly bound to particular lesson topics, contexts, classroom events and learners and therefore difficult to generalise (Lochran et al 2008).

This raises the question of how teacher educators prompt their student teachers to construct PCK when its empirical base is thin and novices tend either to underestimate its significance or find it to be at variance with their intuitive conceptions of teaching. Teacher educators need to provide organised

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opportunities for student teachers to construct their own PCK during their coursework and practical teaching. Recent research suggests that teacher educators have various tools at their disposal for prompting pre-service student teachers to develop their PCK. Nilsson (2008), for example, explores how the promotion of guided reflection on student teachers' initial attempts at teaching is able to stimulate the construction of their PCK. Similarly, Lochran et al. (2008) suggest that student teachers study the way that expert teachers have analysed the core knowledge around a topic and identified key issues for learning. They argue that such analysis helps pre-service teachers shift towards a pedagogically reasoned approach to teaching.

We contend that another means whereby teacher educators can promote the construction of PCK is explicitly by requiring that student teachers consider the constituent parts of PCK *in relation to one another* during lesson planning. We draw on aspects of an integrative model that proposes that a blending or integration of contextual, pedagogical and content knowledge bases constructs PCK (Gess-Newsome 1999). Thus while student teachers can develop their subject knowledge and pedagogical knowledge independently, these forms of knowledge become a powerful basis for teaching when decisions are made on the basis of a merged consideration of these components of PCK. Lesson Planning Guidelines therefore have the potential to act as a scaffold for the construction of PCK.

Lesson planning as technical knowledge

Knowledge of how to plan lessons is often regarded as technical or instrumental knowledge (Kemmis and Smith 2008; Linnē 2001). This is illustrated by various international and South African texts written to support student teachers as they 'learn to teach'. The reasons given for lesson planning mostly focus on the role that planning plays in enabling student teachers to cope ably with the immediate demands of the lesson itself (their improved confidence in knowing what they need to do during the lesson) and in enhancing their ability to cope with the unexpected (e.g. Criticos, Long, Moletsane, Mthiyane and Mays 2009; Killen 2010; Hayes 2003; Shalaway 1997). Student teachers are warned that failure to plan thoroughly results in aimless teaching, the choice of inappropriate teaching strategies, time wasted and classroom management problems (Criticos et al. 2009). Further reading on a topic is advised to enable a student teacher to answer questions from learners "correctly and convincingly" (Killen 2010:85). Similarly, examples from international literature regard lesson planning as important for instructional effectiveness (Gall and Acheson 2011:94), scheduling curriculum content, proving that teachers are doing their jobs and providing a guide for substitute teachers (Dunn, Craig, Favre, Markus, Pedota, Sookdeo, Stock and Terry 2010:194); and that lesson plans are important as frameworks for "conceptualizing, designing and delivering instruction" (Ozogul and Sullivan 2009:393). The value of lesson planning is hence seen in terms of subsequent instructional performance, and it is the *product* of the action of lesson planning that is emphasised, not the value of the *process*.

As teacher educators, we reflect critically on this technical approach to lesson planning, arguing that this is a limiting approach, particularly when applied to pre-service student teachers. As a result of our inquiry into lesson planning as it is conceptualised in the literature and instantiated in student teachers' work, we are convinced that the practice of lesson planning should offer more to the development of a professional knowledge base for teaching than merely enabling student teachers to hold their own in a classroom.

Lesson planning guidelines for student teachers

Our university's previous Lesson Planning Guideline was presented as a template with blank spaces to be filled in for ease of use. However, because each section was conveniently contained in its own

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designated space, students were not compelled to consider the ways in which the various components of PCK could intersect. The representation of conceptual knowledge and the pedagogical choices within the lesson thus remain logically disconnected, as if all possibilities could be equally appropriate. After critically examining the way our previous Lesson Planning Guideline promoted an instrumentalist approach to lesson planning, it became understandable why student teachers regarded lesson planning as a description of classroom procedures written primarily for the benefit of the university tutors who were assigned to observe their teaching.

The template, dating back several years, reflected the primacy of curriculum outcomes and a technical or instrumental approach to planning for teaching and learning (John 2006; Linnē 2001). Sizeable parts of our previous Lesson Planning Guideline required student teachers mechanically to seek and copy the relevant Learning Outcome/s and Assessment Standard/s from the curriculum documents. This is problematic because, as Shalem (2010:91) explains, "lists of statements do not have a way to show what concepts are key to a field, what activities are worthwhile and what texts are worthwhile". A Lesson Planning Guideline that focuses on the identification and writing up of outcomes therefore does not make explicit the internal logic that should guide prospective teachers in the way they think about conceptual progression, the conceptual relations within the knowledge field and what constitutes appropriate inquiry processes within a subject.

Our previous Lesson Planning Guideline required student teachers simultaneously to detail the conceptual progression of content knowledge within their sequencing of lesson steps. This expectation conflated understanding of content knowledge and its transformation for systematic presentation. Both Shulman (1987a) and Morrow (2007) indicate that these are two distinct processes which are not logically interchangeable. Knowing and understanding the concepts within the subject or topic to be taught logically precedes a process of transformation of the content to enable learning.

For the above reasons, we contend that our previous Lesson Planning Guideline neither intervened in student teachers' tendencies to perceive lesson steps as classroom procedures nor explicitly required student teachers to consider aspects of planning that promote the development of their PCK.

As has been found elsewhere (for example John 2006), this approach to lesson planning can, in part, be explained by the demands of Outcomes Based Education (OBE) which was introduced in South Africa by the post-liberation education department. Given our common roots in OBE curriculum imperatives, we were not surprised to see commonalities in our previous Lesson Planning Guideline and in lesson planning guidelines presented in several South African textbooks for student teachers. Essentially, the approach is similar to the one recommended by Ralph Tyler (1949). Students are expected to take outcomes from policy documents and adopt a backward design process, constructing a coherent learning process towards the attainment of the specified lesson outcomes and assessment standards. The emphasis on learning outcomes and assessment standards as the starting point for lesson planning is seen in volumes such as *Help, I'm a student teacher!*, where Du Toit (2010:150) maintains that lesson planning should be guided by consideration of "where learners are going; how they are going to get there and how will they know that they have arrived", advocating that learning outcomes and assessment standards be written out in full. Similarly, in *Becoming a teacher,* Du Plessis (2010:74) outlines a six-step process for lesson planning, which employs a backward design logic from stated outcomes. Steps 1, 2 and 5 require student teachers to identify and articulate outcomes of various types. Within Step 2, student teachers are urged to obtain content knowledge and skills from the learning outcomes and assessment standards.

A teacher's understanding of content knowledge is described by Morrow (2007:82) as a "necessary precondition" for teaching, as he argues that knowing and understanding the content necessarily *precedes* the design of a learning process and creates conditions of possibility for pedagogical thinking. This is at variance with approaches to content knowledge found in these, and other texts. Both Du

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Toit (2010:168) and Du Plessis (2010:74) suggest that in planning, consideration should be given to teaching, learning and contextual factors "and/or" content knowledge. By using the phrase "and/or", understanding of content knowledge is presented as an optional consideration, not a fundamental determinate of pedagogical reasoning. The implication here is that for lesson planning students need to consider either the context or the conceptual knowledge, but not necessarily both. Morrow (2007:85) refutes the notion that content knowledge is optional, stating that "any teaching...has some content" but argues that content "can and does refer much more centrally to skills, capacities and dispositions and the practices in which we are trying to enable pupils to become practitioners" (p.126). That content and contextual factors are conflated into a single step suggest that consideration of the context and the concepts to be learnt is part of the same thinking process. By contrast, in *Becoming a teacher,* De Beer and Gravett (2010:80ff) present content knowledge as a distinct feature, but only as the fifth out of six questions to answer in lesson planning and only addressed after considering learner diversity, outcomes, timeframes and facilities. Our concern in this regard is that students are encouraged to draw on general pedagogical knowledge without adequate consideration of what methodological approaches are appropriate in terms of the demands of the content knowledge. In *Getting practical,* Criticos et al. (2009:75) stress the importance of content knowledge, explaining how lesson plans and unit plans need to be clear about "what sub-concepts [to] teach and how these will be linked together; what content [will be used] to teach these concepts [and] how [to] teach these concepts". This assertion is undermined, however, in the given Lesson Planning Guideline where the articulation of the conceptual structure of the knowledge to be taught is not included.

Our concern regarding this dominant approach to lesson planning is that it fosters a conception that teaching involves mastery of a collection of classroom management skills and teaching strategies that generically and mechanically can be employed irrespective of the nature of the content knowledge taught. The confluence of our concerns and the government announcement that the school curriculum would be recast with more of an emphasis on content and less on outcomes provided the impetus to revise our university's Lesson Planning Guideline for student teachers.

The revised Lesson Planning Guideline for student teachers

The revised Lesson Planning Guideline, developed collaboratively by a team of teacher educators, is presented to students as a series of five issues that need consideration before student teachers embark on their design of lesson steps. Student teachers are required to consider the purpose of their lesson, articulate their understanding of the content knowledge to be learnt, reflect on the learners for whom the lesson is intended and the ways in which they might engage with the content knowledge and, finally, substantiate their choices of the teaching and learning strategies that could be appropriate in light of the previous considerations. The heading "Rationale for lesson design" distinguishes this Lesson Planning Guideline in the minds of students from others that they may see in textbooks or be given by supervising teachers during practical teaching. The revised Lesson Planning Guideline is appended, and we have included (with the student's consent) an example of how a student teacher has used the Lesson Planning Guideline to prepare a Maths lesson. In the section which follows, we describe the revised Lesson Planning Guideline in some detail, with particular attention to the ways in which the various sections act as a scaffold to promote student teachers' construction of PCK.

The first section of the plan is that of providing **routine information** of grade, subject and duration of the lesson. Students are then required to relate the subtopic of the lesson to the preceding and subsequent lesson topics. Because school knowledge is complex and learning takes place over a period of time, teachers have to sequence learning and order the trajectory of subject matter (Shalem and Slonimsky 2010:20) to enable conceptual development. Student teachers, especially in their first year or two of teacher education, often teach isolated lessons on topics given to them by supervising teachers. Even

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when unit planning is explicitly required of senior student teachers, some students avoid longer term planning, or complete unit plans retrospectively (Rusznyak 2008). By requiring that students consider their lesson within a sequence of other lessons, they are oriented to an awareness of the progression that characterises systematic learning.

Section 2 asks student teachers to consider the *purpose* of the lesson. The revised lesson plan no longer requires reference to learning outcomes, but still retains a focus on knowledge, skills, attitudes and values. To focus on content knowledge, students are required to write key questions that learners should be able to answer by the end of the lesson. Selecting and phrasing these questions demands that students identify and focus on the big ideas or core concepts of the content which they will be teaching. Wiggins and McTighe (2005:71) usefully suggest that a distinction be made among core ideas, what is important to know and do, and what is worth being familiar with. Given the temporal limits of a lesson, it is vital that students are able to distinguish a hierarchical relationship between organising ideas and supporting detail of content knowledge, and are able to foreground the former.

The second consideration under 'purpose' is what skills learners will learn or practise. Students are prompted by the sentence "During this lesson, learners will learn how to ..." and their response should articulate with the learner activities presented. Finally, students should describe purpose in terms of what the lesson promotes as being good or just or fair under the heading of "Attitudes and values". These skills and dispositions should be consistent with engagement with the practices of the discipline taught (Grossman, Schoenfeld and Lee 2005) and should be logically derived from the knowledge domain dealt with in the lesson. By learning and practising the skills and procedures of the discipline, learners of a school subject are inducted into the practice of that discipline. It is thus important that student teachers do not merely record generic skills that have no clear relationship to the field of knowledge within which they are working.

Section 3 of the revised Lesson Planning Guideline requires students to summarise their own understanding of the most important **content knowledge** of the lesson. In order to catalyse the construction of PCK, consideration of the constituent parts is likely to enhance development of PCK as a whole (Nilsson 2008:1284). As a component of PCK, the articulation of the lesson's content knowledge remains the logical foundation from which the construction of PCK can proceed (Rusznyak 2010). Morrow (2007:84, 85) asserts that for teachers to know how to make content accessible to learners, they require "... an articulated conceptual understanding of the content". While students are encouraged to use whatever format best suits the content (e.g. a concept map, flow diagram or paragraph), they are expected to show how ideas are networked and how knowledge is organised. Their response to this third section in essence answers the key knowledge questions that relate to the lesson's purpose stated in Section 2.

We contend that this articulation of subject knowledge is vital. Not only does it give teacher educators the means to identify gaps in the students' knowledge, but it also compels student teachers to begin to develop expert knowledge of their content. Bransford, Brown and Cocking (2000) suggest that what distinguishes experts from novices is experts' command of concepts and their ability to see patterns, relationships and discrepancies not apparent to novices. The priority of this section (as an item in the lesson plan that precedes any consideration of transformation of the content knowledge for learning) is intentional. We want student teachers not only to demonstrate their own understanding of the content knowledge but also to engage with the inherent logic of the content and use that as a basis on which to organise systematic learning (Morrow 2007). Shalem and Slonimsky (2010, p.20) say it is imperative that the teacher "arranges the content in a shape best suited for *that* content" (emphasis in the original). Knowledge of the content knowledge is essential for the development of PCK (Grossman, et al. 2005:205) and our initial analysis shows that those students who are better able to articulate their conceptual, factual or procedural knowledge in this section of the plan were generally better able to plan a logically coherent lesson.

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Section 4 of the revised Lesson Planning Guideline requires student teachers first to answer the broad question of which aspects of **learner diversity** need consideration during this lesson. We regard it as particularly important that students consider diverse learning needs as an integral part of planning, in the tradition of universal design, rather than planning a lesson and then looking for ways to adapt aspects of the lesson to accommodate diversity (Walton 2010). Students are then required to consider the relations between two components of PCK, namely their contextual knowledge of the learners and the content knowledge to be taught.

Student teachers are asked to consider the various ways in which their learners might engage with the lesson topic. Student teachers are prompted to consider what the **prior knowledge** of learners might be. Previous knowledge may be school knowledge from previous lessons and it is essential that student teachers are able to build progressively on that knowledge when introducing new content. Learners' previous knowledge may also be their everyday knowledge that has been learnt spontaneously and experientially. Student teachers are asked explicitly to draw on their knowledge of their learners and the context to gauge what learners in the specific context may bring as everyday knowledge. Student teachers are asked to consider what **subject vocabulary** or terminology learners would need to learn during the lessons.

Students' attention is drawn to what **common misunderstandings** or mistakes learners might make and what **examples** could be used to expose and explicitly explore such misunderstandings. This section begins to build students' PCK by requiring them to transform their subject knowledge, pedagogical knowledge and context knowledge into useful instruction (Abell 2008:1408).

This section of the plan also asks students to consider what resources learners could engage with during the lesson, and what learners could produce during the lesson. Because of the importance of learners' active engagement in learning, Morrow (2007:47) regards it fundamental to planning to ask "What will the learners *do*?" (emphasis in the original). Shalem and Slonimsky (2010:21) maintain that any learning has to involve engaging with a cognitive task, but that systematic learning requires engaging in tasks that are aligned with the structure of the subject matter. Thus the logic of the new lesson plan requires that students only consider learner activities after they have articulated the content.

Unlike other lesson plan guidelines where students are merely required to record their choice of teaching and learning strategies, Section 5 of this Lesson Planning Guideline requires student teachers to substantiate their choice of **teaching and learning strategies** appropriate for use in the lesson. In this section, student teachers develop their PCK by considering the demands of the content knowledge and the needs of learners in relation to general pedagogical knowledge of teaching and learning strategies. It is important that student teachers learn to consider teaching and learning strategies that are appropriate to the discipline and to the contextual constraints and possibilities, and also to demonstrate pedagogical thinking to university lecturers and supervising teachers. Morrow (2007:80) maintains that professional judgement, while it cannot be certain, is necessarily rational and that teacher education is responsible to improve the "rationality and reliability" of professional judgement.

All the preceding sections of the lesson plan should, if done adequately, have set the logical conditions for Section 6 of the lesson plan which requires students to "Write a **sequence of lesson steps** that builds a process of learning". In this last section, students must write the aim of each lesson step (for example, to pose a problem or to give instructions) and then describe what will happen in each lesson step. Here we emphasise the various aspects of organising systematic learning: there must be a sequence that reflects the logical progression of learning the particular subject matter within the time constraints of the lesson and each lesson step should contribute to the process of learning. It is here that the transformation of the content in appropriate ways for others to learn culminates in a pedagogically reasoned "plan, or set of strategies, to present a lesson, unit or course" (Shulman 1987b:104).

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While we know that this revised Lesson Planning Guideline will be reviewed and adjusted as we continue to grapple with its theoretical assumptions and its practical use by student teachers in classrooms, we find that the narrative nature of this Lesson Planning Guideline enhances the process of 'learning to teach' in several ways. The open-ended nature of the questions promotes creativity and in-depth thinking that is not encouraged when lesson planning is reduced to an administrative or technical function of filling in a predesigned form. Sections can be expanded or contracted depending on the particular lesson demands and students have as much space as they need to articulate their content knowledge. In addition, as university coursework progressively deepens students' understanding of various parts of the Lesson Planning Guideline, senior student teachers can be expected to provide increasingly nuanced responses in each section.

The rationale requires students to adopt a relational approach to teaching that moves them beyond simply indicating their selected strategies and resources in an atomistic way. In their motivation, students highlight the internal relationships they see between the needs of learners, the demands of content knowledge and their lesson design, thereby making their construction of PCK more explicit to themselves and to their university tutors. By reading their rationale, university tutors can more easily access the thinking that informs their lesson design and are better positioned to probe aspects of their lessons more deeply and offer targeted feedback. In this way, we aim to position lesson planning as a practice, informed by knowledge bases used to make appropriate choices that reflect professional judgement.

A lesson Rationale developed by a student teacher (Refer to Appendix)

Martha is a second year Bachelor of Education student, specialising in intermediate phase teaching. As part of the university coursework designed to support students' professional development, she has been introduced to PCK and oriented to understanding and using the 'Rationale for Lesson Design' format as a lesson planning guideline. Her lesson plan included in the Appendix of this paper was produced during her practical teaching experience and is reproduced with her consent. It was submitted as part of a school-based assignment for a course that introduced students to the teaching and learning of Social Sciences. While we do not regard her workings with the Lesson Planning Guideline as an advanced example of thoughtful planning, we do wish to show how she is starting to work productively within its framework.

Martha situates her lesson within a broader theme of Resource Management and positions her lesson within a sequence. In her lesson's purpose, Martha formulates a clear focus for her lesson, expecting learners to define resources generally, and then to distinguish between resources that are renewable and those that are not.

In Section 3, we notice that Martha is beginning to sequence conceptual progression of knowledge in a systematic manner. She defines the main concept of resources and then moves to explore sub-categories by distinguishing between two types of resources, those that are renewable and those that are not which she illustrates with examples. The concepts she develops in this lesson establish logical conditions for learner understanding of subsequent concepts, like the sustainable use of resources and minerals as a non-renewable resource.

The definitions she provides of her main concepts are fairly rudimentary. She defines renewability in terms of the number of times a resource can be produced and whether or not it gets consumed. However, she does not define renewability in terms of the ability of the resource to regenerate itself. Even if she did not plan to introduce the concept of *potentially renewable resources* to her class of Grade 5 learners, she ought to have articulated this understanding. This is because the latter part of her lesson requires some attention to the careful use of resources so that their sustainability is not compromised. Her examples also need further thought. The summary of her understanding in Section 3 makes her understanding of the content knowledge explicit, and invites further probing during post-lesson observation discussions.

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In Section 4, Martha indicates that she is aware of some of the diverse learning needs of learners in her class. She considers their linguistic background and makes provision for the careful introduction of important vocabulary. She seeks to use examples (like books and T-shirts) that she feels would be familiar to learners. As she learns more about diversity, inclusion, and their implications for pedagogical choices, we would expect a more sophisticated discussion in this section from her in subsequent years.

In Section 5, Martha motivates her decision to use a class discussion to introduce the concepts. This, she believes will provide an opportunity for learners to draw on their familiarity with the objects that she intends using to illustrate different kinds of resources. Martha justifies her choice of learners working individually on tasks as a means to assess learners' comprehension of the lesson topic following the class discussion.

Having adequately articulated content knowledge, Martha has developed a sequence of lesson steps and learning tasks in Section 6 that articulate fairly well with her intended purpose. Martha is beginning to consider pedagogical choices in terms of what she believes that her learners bring to the classroom, how the knowledge is organised and what evidence of learner understanding she expects them to produce. We see evidence that Martha is beginning to construct her PCK and engage productively with what it means to organise systematic learning (Morrow, 2007). Her lesson plan moves well beyond the vague and reductionist lesson steps that characterised the way that many of our student teachers used to plan their lessons.

Challenges of the revised Lesson Planning Guideline

In recognising that our Lesson Planning Guideline resolves some concerns (like atomistic planning), it creates other challenges which have been raised by supervising teachers, fellow teacher educators and students. Because the Lesson Planning Guideline depicts complexities within a process that experienced teachers regard as being straightforward, we have come across opposition from some teachers at schools where our students undertake their practical experience. We concede that expert teachers, who have well-developed PCK and the ability simultaneously to take cognisance of multiple considerations (John 2006) may well regard this Lesson Planning Guideline as onerous and excessively time-consuming. However we maintain that this expanded process is necessary for student teachers who do not yet have a coherent understanding of the complexities associated with lesson planning. While initially this Lesson Planning Guideline introduces students to complexity, it guides them through the complexity of constructing PCK. We ultimately expect that with their increasing base of PCK, student teachers will develop a more automated capacity to make instructional choices not merely in terms of efficiency and easy classroom management, but also considering specific content and what is appropriate for their learners.

Some teacher educators have found the 'one-size-fits-all' nature of the Lesson Planning Guideline not sufficiently attuned to the particular demands of their subject or phase. This has been successfully resolved by minor adjustments to the Guideline for students in those phases or subjects – for example, the Art Department require their students to consider the ways in which learners could be prepared for careful looking, drawing learners' attention to subtle forms and structure of art before they consider issues around the medium and elements used by an artist.

Two particular challenges are raised by students' use of the Lesson Planning Guideline. The first is that in Section 3, some students merely restate their purpose, instead of articulating their content knowledge. We find responses that start "Learners should know about...." and need teacher educators to provide clear guidance to students in terms of how content knowledge could be articulated. Second, there is a desire by some students to convert the Lesson Planning Guideline into their own version of a template or grid which then ties their responses into rigid spaces. We expressly discourage this as we maintain that one of the strengths of the Lesson Planning Guideline is that it provides the opportunity for the expansion of sections as student proficiency develops. Jane, for example, glosses over the issue of

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learner diversity which, given that she is a junior student, is not yet problematic. But as senior students become aware of the demands of a diverse classroom, we would expect them to discuss in some detail how they will respond to this diversity.

Conclusion

The previous Lesson Planning Guideline used by our university, like many others available to South African students, promoted a simplistic conception of lesson planning as the discrete consideration of several aspects of the lesson. Students regarded lesson planning as paperwork for teaching, and their use of the Lesson Planning template was dominated by the descriptions of classroom procedures rather than the consideration of how to enable learning. In this way, the very exercise of lesson planning reinforced their initial conceptions of lesson planning as a technical exercise in which pedagogical choices were made randomly.

Our revised Lesson Planning Guideline attempts through a series of issues for consideration to alert student teachers to the complex relationships between content knowledge, knowledge of learners and their pedagogical knowledge, all of which establish the conditions required for the design of a coherent sequence of lesson steps. The revised Lesson Planning Guideline presents decisionmaking in lesson planning as a complex interplay between the components of PCK, but enables student teachers to work systematically through that complexity. In this way, we maintain that the Lesson Planning Guideline presented here is able to act as a scaffold for the construction of pre-service teachers' PCK.

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Appendix: Rationale for lesson design

(Developed by 'Martha', a 2nd year B Ed student teacher)

Section 1: Routine information:

- Grade 5
- Subject Social Sciences
- Theme: Resources
- Topic of *this* lesson Introduction: Renewable and non-renewable resources
- Topic of the lesson that came *before* Not applicable
- Topic of the lesson that will *follow* Mineral resources in South Africa

KEY QUESTIONS Write the most important questions learners should be able to answer by the end of this lesson.	• 1. What are resources? • 2. What are renewable and non-renewable resources? • 3. Why should we look after resources?
SKILLS What should the pupils learn how to do during the lesson?	During this lesson, learners will • Use a table to distinguish between renewable and non-renewable resources • Participate in the class discussion that identifies different types of resources
ATTITUDES AND VALUES What does this lesson promote as being good or just or fair?	• An appreciation of the different resources in our natural world • Active participation and engagement with caring for the environment

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Section 3: Summarise your understanding of the most important conceptual knowledge of this lesson.

- Resources: What are resources?
- Resources are all the things we use and need to live and work.

Examples of resources they need to live. Eg, air, water, coal for warmth, paper, plastic etc.
Renewable resources: Resources that can be produced and used over and over again. E.g. water, wood
Non-renewable resources: Resources that can only be produced and used once, eg, coal, gold

Why should we look after resources?

- Renewable resources only remain renewable if we look after them;
- Non-renewable resources need to be used carefully and not wasted.

Section 4: Thinking about the learners in relation to the content knowledge of the lesson. Think about:

- What aspects of ***learner diversity*** need consideration?
- How is the content knowledge linked to the ***prior knowledge*** of learners and/or current affairs?
- What ***subject vocabulary/ terminology*** would learners need to learn during this lesson?
- What ***examples*** can you use to help learners understand better?
- What evidence of understanding should learners ***produce*** during the lesson?
- What common ***misunderstandings or mistakes*** might learners make during the lesson?
- How could you pre-empt the possible misunderstandings learners may have?

The content knowledge is linked to learners' prior and everyday knowledge of what resources are. I will work with examples of familiar resources such as paper in a book, a t-shirt made from cotton which they use every day. New vocabulary must be explained carefully. This is especially important because there are learners whose home language is not English in the class.

Learners will need formal introduction to the following terminology:

à Resources
- Renewable resources
- Non-renewable resources

Although learners may know what resources are, they may not necessarily know that resources are either renewable or non-renewable. They may think that all resources can be used over and over again.

Section 5: What *teaching and learning strategies* are appropriate to use during this lesson? Explain the reason/s for your choices.

Class discussion: I want to use this strategy for introducing the topic on resources to draw on the learners' knowledge of objects like books and cotton and to help them see what resources are used to make these objects.

In the activity, learners will be asked questions and also to sort examples of resources into a table. This is to be completed individually because the class discussion was a guide to introduce and make the learners familiar with the differences between renewable and non-renewable resources. Now, I want to find out can the learners answer the questions and sort the resources on their own

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Section 6: Write a *sequence of lesson steps* that builds a process of learning.

<table>
<tr><th>Aim of lesson step</th><th>Describe what will happen in each lesson step</th></tr>
<tr><td>1. Introduce main ideas on resources</td><td>Class discussion:
Give examples of different resources
Define resources: The things we use to live and work</td></tr>
<tr><td>2. To explain a concept and define new vocabulary</td><td>Class discussion:
Introduce renewable and non-renewable

Resources:
Renewable resources: Resources that can be produced over and over again. E.g. water
Non-renewable resources: Resources that can only be produced once, e.g. coal, gold

Answer these questions:
Why is water a renewable resource?
Why is gold a non-renewable resource?

Explain why we should look after resources:
Renewable resources only remain renewable if we look after them</td></tr>
<tr><td>3. To give instructions</td><td>Read through questions with learners, explain what to do: Learners are required to answer the questions individually.

1. Think of other examples of renewable and non-renewable resources and list them in a table like this:

<table><tr><td colspan="2">Natural resources</td></tr><tr><td>Renewable resources</td><td>Non-renewable resources</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>
2. Choose one renewable resource. Write three to four sentences about how people can take care of this resource.

3. Choose a non-renewable resource. Write three to four sentences that tells about how people can use this resource so that there will be some for the future.</td></tr>
<tr><td>4. Recap on main ideas</td><td>Types of natural resources
Why should we look after resources?</td></tr>
<tr><td>5. Homework</td><td>If learners did not complete the tasks in class, they must complete for homework</td></tr>
</table>

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