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Finding epistemic lift in teacher-directed high school classrooms in South Africa

This paper describes instances that begin to illuminate what a systematic and contextually relevant pedagogy could look like in South African high school classrooms, where teacher talk often dominates instruction and there is minimal learner talk. We present instances of three teachers who exhibit moments of "epistemic lift". We define epistemic lift as teachers providing learners with opportunities to grasp the subject from the perspective of the discipline, by establishing appropriate relationships between concepts, structuring concepts from lower to higher-order complexity, and selecting the best examples to demonstrate the subject's generative principles

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Finding epistemic lift in teacher-directed high school classrooms in South Africa

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Abstract

Educational discourse in South Africa draws heavily on the progressive traditions of England and the USA, where good teaching is understood to involve learner participation, dialogue and collaboration. In contrast, South African studies indicate that high school teaching and learning reflect minimal learner discussion, communalised feedback on tasks, recall-level questioning and assessment-driven practices, among others. Drawing on a study of eight schools across the Eastern and Western Cape provinces in South Africa, we present instances of three teachers who exhibit moments of "epistemic lift". We define epistemic lift as teachers providing learners with opportunities to grasp the subject from the perspective of the discipline, by establishing appropriate relationships between concepts, structuring concepts from lower to higher-order complexity, and selecting the best examples to demonstrate the subject's generative principles. These instances begin to illuminate what a systematic and contextually relevant pedagogy could look like in South African high school classrooms, where teacher talk often dominates instruction and there is minimal learner talk.

Introduction

Our recent study of ninety-nine Grade 8 and 10 lessons in eight high schools in the Eastern Cape and Western Cape found that the following features were present: proceduralising of tasks, minimal reading and writing, communalising of task feedback, recall-level questioning, and minimal learner questions or learner talk. There was a strong assessment-driven focus, particularly in Grade 10 classrooms (Galant et al., 2026). Together with other studies (Mthembu, 2022; Murphy et al., 2020; Naidoo, 2019; Naidoo & Mabaso, 2020), there is agreement that most high school pedagogy reflects the transmission of information rather than negotiation, to draw on two of Alexander's (2008) versions of teaching.

In our study, we used the framework of formative assessment (Wiliam & Thomson, 2017) to analyse our classroom data, focusing on teachers' practices of:

1. Clarifying, sharing, and understanding learning intentions and the criteria for success

2. Engineering effective classroom discussions, questions, and tasks that elicit evidence of learning
3. Providing feedback that moves learners forward.

We did not observe many instances of elaborated explanations, individual feedback, dialogue, classroom discussions, or questions which required higher-order thinking – practices favoured in this framework. These are more likely to be observed in classrooms where teaching is seen as negotiation or facilitation. It became clear that the formative assessment framework that we initially used to analyse the classrooms was rooted in a particular version of teaching and a commitment to individualism. It is one of many examples of frameworks and models which present pedagogies as universal, normative and applicable to all contexts, in the tradition of "what works" (Newmann et al., 2007). However, "good" pedagogy is not universal but highly dependent on culture and on teachers' purposes and meanings (Alexander, 2008).

This paper engages with this literature on pedagogy and shows how these normative models often assume a particular understanding of learning and a particular social order in the classroom. The individual learner's role is to participate and take responsibility for their learning; the relationship between the learner and the teacher is apparently democratic. There is also an underlying assumption that "progressive" pedagogies automatically lead to deeper learning, while transmission-based pedagogies are aligned with rote learning. We argue that this is a simplistic assumption and want to interrogate how learning can be advanced within a communalising, teacher-directed pedagogy.

In our data, we observed a few teachers providing learners with opportunities to connect concepts coherently. We argue that this is an example of "epistemic lift", which refers to the pedagogical work required to move learners from spontaneous to scientific concepts (Vygotsky, 1986). The purpose of this paper is to focus on instances where three teachers in our sample of eight high schools demonstrate "epistemic lift", which we describe as teachers clarifying the relevant relationships between concepts, structuring concepts from lower to higher order complexity, and selecting the best examples to illustrate the generative principles of the subject (Rata, 2016; Rata et al., 2019; Vernon, 2020). We explain why we have used the term "epistemic lift" and how we observed it in History, Mathematics and English classrooms in Grades 8 and 10. We argue that these instances can illustrate aspects of systematic pedagogy that teachers can

attain in school circumstances, where regulative discourse (the rule of social and moral order) tends to be more hierarchical and communalised, and teacher talk dominates instruction. Our focus, therefore, is on the quality of teacher talk rather than on whether and how teachers facilitate learner activity, dialogue or discussion.

What is "good pedagogy" and who decides?

It is well documented that learner-centred pedagogy (LCP) has been presented to developing countries as a global best practice in the past four decades (Chisholm & Leyendecker, 2008; Schweisfurth, 2011; Stott & Guthrie, 2024). Definitions and understandings of this term vary, but it is generally understood to be based on the learning theories of Dewey, Vygotsky, and Piaget. Dewey argued for experiential learning, which links to learners' lives and community. Vygotsky's Zone of Proximal Development reveals the gap between the learners' knowledge and requirements of a task, arguing that learning happens when the learner acquires the resources to close that gap (Brodie et al., 2002). It encompasses pedagogy that provides learners with opportunities to construct knowledge from their existing and new experiences, using problem-based or discovery learning approaches (Altinyelken, 2010). South African education policy in the past three decades has drawn heavily on these progressive ideas, particularly in the first democratic curriculum reform, called Curriculum 2005. This kind of pedagogy was expected to develop learners' abilities to think critically, communicate ideas and adopt democratic ideals of debate and tolerance. It was also hoped it would improve learner achievement, but there is little evidence of this, partly due to uneven implementation in developing contexts (Tabulawa, 2013).

Many studies provide a wide range of reasons why LCP has seldom taken root in developing countries (O'Sullivan, 2004; Tabulawa, 2003; Vavrus, 2009). Tabulawa (1997) argues that LCP is underpinned by an individualistic philosophy and a constructivist epistemology, which clash with collectivist cultures and those that embrace an objectivist epistemology. Since pedagogy is both the act of teaching and the beliefs and discourses that underpin the practices (Alexander, 2008), a teacher cannot change their teaching practices if their underlying beliefs clash with the proposed practice. This explains why the *strategies* of learner-centred pedagogy, such as group work activities, are easier for teachers to adopt than a deep understanding of the learning principles which underpin these strategies. There are also material barriers, as LCP is premised

on small classes, individualised engagement with learners and a wide variety of learning resources.

It is now generally accepted that the terms "learner-centred pedagogy" and "teacher-centred pedagogy" are binary terms that are not very nuanced or helpful when researching pedagogic practices (Alexander, 2009; Barrett, 2007). They provide broad brushstrokes to describe teacher practices, but in a normative way, often advancing learner-centred pedagogy as the only way learners can construct knowledge. However, humans always construct knowledge when they learn, irrespective of the pedagogic mode (Jaffer, 2010).

Progressive pedagogy privileges the individual learner and focuses on the learner's innate abilities and talents (Bourne, 2004) and thus assumes that learners come to the classroom able to access them. Progressive pedagogy is an example of an invisible pedagogy, where the rules of classroom discourse and knowledge acquisition are not made explicit; they are often hidden from learners (Bernstein, 2000). A critique of a progressive pedagogy is that it does not make the rules of schooling explicit, assuming that all learners are familiar with them. In contrast, visible pedagogy makes the selection, sequencing, pacing and evaluation of knowledge clear to learners and does not assume that learners will automatically understand the rules of "the schooling game" (Bernstein, 2000).

Despite strong support for learner-centredness in the South African curriculum, most high school teachers employ a traditional teacher-led pedagogy, working with the whole class as a homogeneous group, with little or no differentiation of tasks or individual performance (Mthembu, 2022; Murphy et al., 2020; Naidoo, 2019; Naidoo & Mabaso, 2020). Thus, the pedagogy is visible and communalising – akin to Alexander's (2008) term collectivism, which reflects common knowledge, a national curriculum and learning together, rather than in small groups.

Given the persistence of teacher-led, communalising pedagogy in many South African classrooms, despite thirty years of curriculum reform (Muller & Hoadley, 2019), it is important to engage with what might constitute a productive pedagogy in classrooms where the discourse is led and dominated by the teacher. Guthrie (2018) refers to this as a formalistic pedagogy in which learners primarily receive knowledge from teachers, rather than engaging in problem-based or enquiry learning activities.

Stott and Guthrie (2024) describe an example of teacher-led pedagogy that was effective in a poorly resourced natural science classroom in a school where learners experienced constrained social and economic conditions. They describe how the teacher, Mr N, improved the learning outcomes of his Grade 9 class, which had performed poorly in Grade 8. Lesson observation shows that Mr N was in control of the lesson and established clear rules and rituals which supported learning. Learners knew what they were required to do and responded to the question-and-answer routines. These required memorising basic facts and principles at lower cognitive levels, using closed and cloze questions designed to elicit the "correct" answers. Mr N was authoritative about the subject but was not authoritarian in behaviour. He used translanguaging to connect everyday and specialised vocabulary. Stott and Guthrie (2024) argue that this visible pedagogy, embedded in a positive and respectful classroom environment, was a key factor in the learners' improved results.

This is an example of what Bernstein calls a "radical visible pedagogy", which is a "radical realisation of an apparently conservative practice" (Bernstein, 1990, p. 72). The radical aspect of a visible pedagogy refers to the aim to induct all learners into the discourses of school knowledge (Barrett & McPhail, 2021). Rata et al. (2019) use the term "engaging realist pedagogy". Bourne (2004) argues that a radical visible pedagogy presents learning as a "collective endeavour rather than a neutral and individual attainment" (p. 66). Further, the focus on "innate individual 'ability' and 'talent' are replaced by the concept of collective access to and participation in academically valued social practices and the discourses by which they are constituted" (*ibid.*).

In the high school classrooms we observed, we saw learning presented as a collective endeavour, but it was not always clear that students were engaging in academically valued practices and discourses. There was little evidence of a pedagogy that specialises the consciousness of the learner by providing access to new ways of thinking about the world. Rather it seems to prepare them to pass the examination. We saw only a few examples of teachers inducting learners into the discourses of school knowledge. Thus, we decided to interrogate these instructional discourses in these classrooms in more depth. Instructional discourse concerns the knowledge and skills transmitted through pedagogy (Bernstein, 2000). This discourse is embedded in a regulative discourse – or set of social norms and behavioural expectations – which include particular understandings around the relationship between teachers and students.

The regulative discourse in our classroom sample is communal, where the class is treated as an undifferentiated whole. Teacher talk constitutes most of the lesson. We shifted our focus to what is transmitted to learners and what criteria we might use to describe this. We turned to the concept of "epistemic lift", which is explained in the following section.

Epistemic lift and a social realist approach to knowledge

We draw on a social realist approach to knowledge, which argues that knowledge is real, and the "knowledge that most reliably develops students' understanding of and ability to act upon the world should be prioritised in the curriculum" (Barrett, 2024). Thus, a key purpose (but of course, not the only purpose) of secondary schooling is to provide epistemological access to both the propositional and procedural knowledge of a school subject (Muller, 2014). It is not possible to perform procedures without knowledge of concepts. To do this, teachers need to make the rules of conceptual progression clear (Rata et al., 2019). Popper argues that "epistemic knowledge is the type of knowledge which, although created within a social context, becomes separated or abstracted from that context through processes of objectification and generalisation" (Rata et al., 2019, p. 4). Its constituent concepts are structured according to the inferential relations that link those integrating concepts within increasingly larger systems of meaning to create propositional knowledge ("knowledge-that"). In addition, inferential relations of meaning also connect "knowledge-that" to procedural or practical knowledge ("knowledge-how"). This is the knowledge required to apply the concepts at progressively higher levels of subject mastery.

Rata argues that epistemic ascent is the same as conceptual progression. This means that learners learn to bring the concepts that they already understand into new relations of abstraction as additional concepts are learned and integrated into their understanding (Rata, 2016, p. 172). Thus, a pedagogy that positions conceptual progression at the centre provides opportunities for epistemic ascent, that is, learners' ability to make connections and to infer from one concept to another. This happens when teachers model how ideas are linked to one another in increasingly complex forms of abstraction and generality. Further, they demonstrate how those abstractions are applied in practice. Since propositions derive their meaning from a web of related propositions (Winch, 2013, it is important for teachers to make these relationships clear. This pedagogical process will enable learners to develop their capacity to infer meaning that is

appropriate for the subject (Hordern, 2024). For example, in history, it is not sufficient to know the definitions of a republic and of a monarchy; a learner also needs to be able to infer that if *a country is a republic, it cannot have a monarch.*

The curriculum design coherence model (Rata & McPhail, 2020) emphasises the importance of teachers selecting the concepts they will teach and then connecting content that best illustrates those concepts. A key principle in this model is that concepts and content are not the same thing (McPhail, 2025). There is a difference between concepts, which are more abstract and generalisable, and the content that illustrates them. Young and Muller (2013) suggest that concepts are the structure through which powerful knowledge is organised, and content provides the referents for those concepts. This works for a subject like history, where concepts such as colonialism or nationalism, can be understood or illustrated using different sets of content. However, this concept-content distinction does not work in mathematics, where concepts constitute the content associated with a particular content area.

In the curriculum design coherence model, teachers make connections between know-how (procedural knowledge) and know-that (propositional knowledge). McPhail (2025) argues that these explicit connections support deep learning, which is the ability to think abstractly, make inferences and apply the conceptual knowledge in new contexts.

From our engagement with the ideas of Winch, Young, Muller, Rata and McPhail, our working definition is as follows: Epistemic lift refers to the opportunities provided by teachers for learners to grasp both the propositional (know-that) and procedural (know-how) disciplinary knowledge. Teachers reveal the epistemic structure of the knowledge to be taught by making the conceptual progression and connections clear to learners (Rata et al. 2019).

While the logics of a school subject differ from those of its parent discipline, school subjects do have some relationship to their parent disciplines, albeit in very different ways. In Mathematics, the relationship is tightly coupled, as school mathematics is underpinned by the axiomatic structure of the field. In contrast, school English is loosely coupled to a range of different disciplinary bodies of knowledge (for example, Linguistics and Literary Studies). Similarly, epistemic lift would vary across different school subjects.

Drawing on the above authors, the following indicators show how teachers can provide opportunities for epistemic lift:

- Teachers use specialised terminology aligned to the discipline
- Teachers productively use everyday or local examples that deepen learners' understanding of the key concepts and content
- Teachers show clear and systematic disciplinary connections between concepts
- Teachers make explicit the disciplinary principles that inform the inferential relations between concepts
- Teachers make explicit the inferential relations between propositional knowledge (know-that) and procedural knowledge (know-how)
- Teachers provide structured opportunities for learners to engage in practices that are aligned with the discipline.

Mapping opportunities for epistemic lift onto different school subjects

The indicators will look different across school subjects because propositional and procedural knowledge are discipline-specific, and the relationship between subject and discipline varies. The following section presents how these indicators could be understood in History, English and Mathematics.

Many history educationists argue for the importance of learning both first- and second-order knowledge (Chapman, 2021; Counsell et al., 2016). First-order knowledge refers to the events and stories of the past. This comprises general substantive concepts (such as colonisation, nationalism, universal franchise); singular factual propositions and historical concepts. This knowledge would fit into Winch's category of "know-that". These propositions are the products of historical enquiry. There is a hierarchical relationship in how teachers show that singular factual propositions are instances of general substantive concepts or of historical concepts. If this is made explicit, there is an instance of epistemic lift.

Second-order knowledge in history refers to the historical time, causation, change, evidence, significance, and interpretation (Chapman, 2021). Lévesque (2005) argues that second-order knowledge arises implicitly in the act of conducting historical inquiries. The South African history curriculum envisages history as a process of historical enquiry, in which learners learn to interpret various sources, engage with different perspectives on events, explain causation, change, and continuity (Department of Basic Education, 2011). It argues for a close relationship

between the school subject of history and the discipline and aims to induct learners into the process of historical enquiry. Epistemic ascent would be seen in history classrooms where teachers make second-order knowledge – such as chronology, change, causation, significance, evidence, and interpretation – clear to learners.

School English presents a particularly complex case when considering the relationship between the subject and its parent discipline, partly due to the on-going "expansion, splitting and reconfiguring of the field at the tertiary level" (Macken-Horarik, 2024). At the secondary level, the subject can be conceived of in three strands: (1) *literature* involves the appreciation and enjoyment of texts; (2) *literacy* concerns understanding and producing English accurately and fluently, creatively and critically, in different modes (including digital); and (3) *language*, which is knowledge about the language and how the language works – including grammar and the study of language structure (Freebody, 2013). This idea of English as three different strands of disciplinary content has been disputed by those who argue that the emphasis should be on the dispositions and experiences of those who teach and learn the language, and thus on *processes* of learning – reading, writing, viewing, speaking, listening and presenting (e.g., Doecke & Yandell, 2025). The question of how these different dimensions relate to one another and how they are integrated is a further source of contestation within the subject community.

Macken-Horarik (2014) captures a number of these distinctions in her models of English that foreground different domains and that have varied over time and place: (1) the growth model, foregrounding the personal/subjective, (2) the skills model, focusing on language structure (grammar), (3) cultural heritage (an appreciation of literature), and (4) critical (reading texts as socially constructed and ideologically laden). The differences between these different models contribute to the difficulty in developing a "unified account of disciplinarity" (Macken-Horarik, 2011). She argues that it is important that the different bases or principles informing different models are made available to students. "Only then can students learn what counts in what contexts and begin to tease out the salient from the incidental" (p. 208).

Macken-Horarik (2011) also argues that the content of the domains (or models) must be related to processes of knowing – how the domain knowledge is used differently in reading, writing and speaking processes. In this way, students can generalise or abstract from their reading, writing,

speaking, listening, viewing and designing processes. Whatever model of English is in play, epistemic lift entails making the conceptual base for the model explicit and showing how it might be realised in the processes of using the language (a kind of procedural knowledge). In this segmented subject, Christie and Macken-Horarick (2007) argue that "a powerful invisible pedagogy often applies, such that what is evaluated as success is tacitly understood, rather than clearly articulated" (p.157). They argue for making the *systemic functional linguistic* elements of the subject explicit, thus exposing the criteria necessary for successful performance.

Therefore, there are two possible axes along which epistemic lift can be considered in English classrooms:

1. Identifying and engaging with the principles underpinning the particular model in use (the domain specific knowledge)
2. Applying, using or identifying those principles in processes of reading, writing, speaking, listening, viewing and designing.

It is well known and uncontested that the subject school mathematics differs from the discipline Mathematics, (Bosch & Gascón, 2006; Watson, 2008). Watson (2008, p. 3) argues that school mathematics does not constitute "a subset of the recognised discipline of mathematics, because it has different warrants, authorities, forms of reasoning, core activities, purposes and unifying concepts, and necessarily truncates mathematical activity in ways that are different from those of the discipline." However, we must acknowledge that school mathematics is underpinned by the axiomatic structure of Mathematics. The calculations performed by teachers and learners are bound by the axiomatic structure of the field of the reals even though this is not explicitly taught and examined. For example, x is always 5 if $x + 2 = 7$, whether such a statement emerges in the context of a school classroom or is produced by a mathematician. As such, school mathematics is inextricably connected to Mathematics.

Many argue for the inclusion of practices that emulate those of mathematicians in school mathematics (Devlin, 2012; Watson, 2008). The approach to teaching advocated in the Curriculum and Assessment Policy Statement (CAPS) refers to elements of what it means to act like a mathematician (DBE, 2011, pp. 5–8). These include: (1) problem-posing, problem solving, critical and creative thinking; (2) generalisation and proof – learners should "generalize, make

conjectures and try to justify or prove them"; (3) mathematical modelling through the inclusion of real-world problems. Despite references to aspects mimicking the behaviour of mathematicians, the focus in school mathematics is largely on learning to apply various procedures for solving classes of mathematics problems. The procedures used in pedagogic contexts entail propositional knowledge that either aligns with the discipline of mathematics or does not accord with Mathematics.

For the subject school mathematics, epistemic lift means that:

- procedures employed by teachers recruit definitions, propositions and axioms of the field of real numbers;
- definitions used by teachers and learners align with accepted definitions in the field of mathematics, and
- proofs are based on definitions and propositions aligned with the field of Mathematics.

For example, a procedure for solving a linear equation that employs inverses and identity exemplifies epistemic lift, since inverses and identity serve as the propositional knowledge underpinning the procedure. However, note that a procedure for solving linear equations involving transposition rather than inverses and identity is not an example of epistemic lift since propositional knowledge entailed in the procedure is located outside of Mathematics. The point is not simply the presence of propositional knowledge (knowledge-that) that needs to be examined. It is the nature of the propositional knowledge that signifies whether epistemic lift is evident.

Methodology

The research was conducted in eight high schools in the Western Cape and Eastern Cape provinces of South Africa. These two provinces represent distinct socio-economic, historical, and educational contexts. The Eastern Cape is one of the poorest provinces in South Africa, with high levels of unemployment, rural poverty, and limited infrastructure. The Western Cape, in contrast, is more urbanised, has better infrastructure, higher income levels and generally higher educational outcomes.

In each province, we selected two fee-paying and two non-fee-paying schools. In each school, we selected Grade 8 teachers who taught English, History and Mathematics, and at the Grade 10

level, also included the Grade 10 Mathematical Literacy teacher. Thus, there were seven teachers at each school who we interviewed and observed teaching two consecutive lessons in the third term of 2024. During the lessons, researchers took field notes and video-recorded them. Some teachers only agreed to an audio recording of the lessons. Overall, we recorded 99 lessons, which form the data set for this paper.

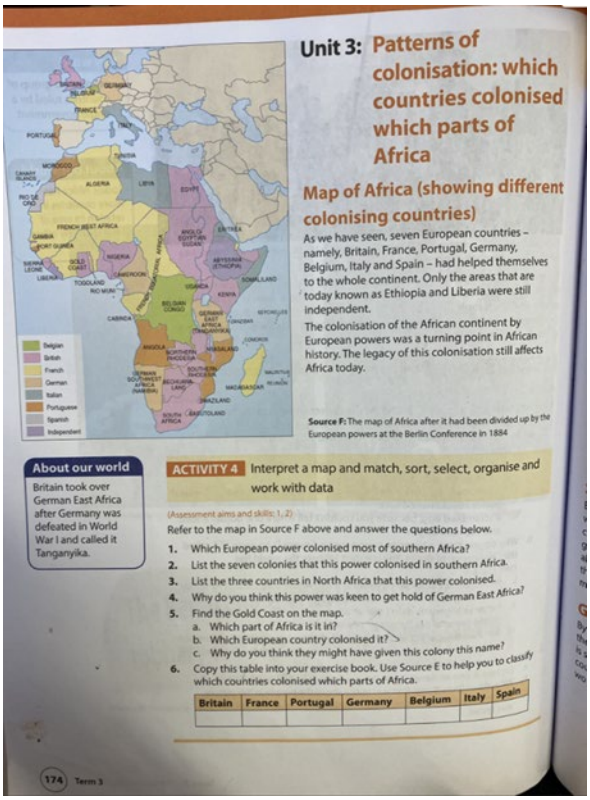
In this paper, we do not draw on the interview data, but focus on exemplars of epistemic lift seen in selected English, History and Mathematics classrooms. We do not count the number of instances we observed; instead, we provide qualitative exemplars from three subjects. In each subject, we have selected one teacher's practice as an exemplar.

Exemplars illustrative of epistemic lift

Epistemic lift in a history lesson

There are 38 learners in the Grade 8 history class at School C, which is a low-performing township school in the Western Cape. The school is fully funded by the state, and charges no school fees. The teacher has twenty years of teaching experience and has a strong presence in the classroom. She starts the lesson by checking which learners are present, which creates a clear start. The focus of the lesson is communal corrections of the textbook activity that learners completed the day before. The task is to work with a map showing the patterns of colonisation of Africa.

She makes explicit connections with previous knowledge covered, asking, "Who ruled over Africa? Who was in charge in Africa during that time? Before it was partitioned? What kind of government was there in Africa during that time?" The learners respond in unison that there were decentralised states.



Unit 3: Patterns of colonisation: which countries colonised which parts of Africa

Map of Africa (showing different colonising countries)

As we have seen, seven European countries – namely, Britain, France, Portugal, Germany, Belgium, Italy and Spain – had helped themselves to the whole continent. Only the areas that are today known as Ethiopia and Liberia were still independent.

The colonisation of the African continent by European powers was a turning point in African history. The legacy of this colonisation still affects Africa today.

Source F: The map of Africa after it had been divided up by the European powers at the Berlin Conference in 1884

About our world

Britain took over German East Africa after Germany was defeated in World War I and called it Tanganyika.

ACTIVITY 4 Interpret a map and match, sort, select, organise and work with data

(Assessment aims and skills: 1, 2)

Refer to the map in Source F above and answer the questions below.

1. Which European power colonised most of southern Africa?
2. List the seven colonies that this power colonised in southern Africa.
3. List the three countries in North Africa that this power colonised.
4. Why do you think this power was keen to get hold of German East Africa?
5. Find the Gold Coast on the map.
   a. Which part of Africa is it in?
   b. Which European country colonised it?
   c. Why do you think they might have given this colony this name?
6. Copy this table into your exercise book. Use Source E to help you to classify which countries colonised which parts of Africa.

Britain	France	Portugal	Germany	Belgium	Italy	Spain

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Figure 1 Textbook activity (Platinum Social Sciences, Learner Book Grade 8, p. 174)

She then turns to the textbook activity (See Figure 1). She reads out the first question of Activity 4: "Which European power colonised most of Southern Africa?" She asks learners how they arrived at the answer (Britain) by drawing their attention to the key that accompanies the map of Africa. She makes explicit the principles that inform the inferential relations learners need to infer from the key provided with the map: "Which country's colour is most visible in Southern Africa?" The skill is that of reading a key, which is an important but generic skill; it is not a historical skill. She makes explicit how colonisation of Africa is directly linked to industrialisation in Europe and Britain. She shows clear, systematic connections and relationships between concepts. She emphasizes that it is not enough to know that Europe wanted raw materials; it is also important to know why.

> T: In fact, they wanted direct access to raw materials. And we know the story that once they got access to raw materials, what did they do with the raw materials? The raw materials were shipped to where?
>
> Ls (in unison): To Europe.
>
> T: And why Europe? Because Europe was already industrialised, no? Okay? Europe was already industrialised. And what did that mean, Europe being industrialised? Europe had factories, no? Had machines and factories to process raw materials, no? Into products, okay?

The teacher uses the textbook to present the content and asks learners questions about the text, which was unusual in the history lessons observed in the larger study. The learners all read the text on Christian missionaries aloud: "*They called Africa the 'Dark Continent'. They believed white people were superior to black people and that they had a duty to bring light to the dark continent*". The teacher asks:

> T: Was the continent really dark, or did they believe that Africans were in spiritual darkness? [discussion in isiXhosa]
> Were Africans non-believers?
> L's Chorus: no
>
> T: What proof do you have that Africans were believers?
>
> Ls: They believed in ancestors.
>
> T: In North Africa, there was a belief in Islam. So, it was not in darkness.

She asks the learners to connect what they already know about Africa and bring that knowledge to question the missionaries' belief that Africa was a "dark continent". In this way, she models that the text can be questioned by bringing existing knowledge to bear on it. This was not a common practice observed in many history lessons.

In summary, the teacher made two principles visible to learners: making inferences from the map key to interpret the map of colonised countries and making connections between concepts. She also modelled how the textbook can be questioned by drawing on one's historical knowledge. However, there was no explicit focus on disciplinary procedures or making disciplinary inferences.

Epistemic lift in an English lesson

A Grade 10 English (First Additional Language) lesson taught at School D starts with the teacher carefully delineating time and space for learning in a school where periods are often different lengths, where absenteeism and late coming are common and where the noise and disorder in the transitions between lessons is overwhelming. The teacher asks learners to stand and greet her, formalising the commencement of the lesson. She then reads out the register, ascertaining who is missing. Three learners arrive late and are told to stand by the door, where they stand for the entire lesson. The space is thus specialised for instruction, and the regulative conditions are stabilised. The lesson then begins, focusing on conjunctions and connectors, structured around an exercise from the textbook. The teacher works through a set of sentences that learners are

required to join using conjunctions, and then a set where they provide connectors. Another unusual regulative feature of the classroom is that the teacher works through a class list, ticking off the names of each student as they take a turn at reading sentences aloud and providing the appropriate conjunction or connector. In this way, the teacher ensures participation of every learner as each learner's turn is ticked off from her list. However, the intention appears to be more about whole class participation than checking of individual understanding. Specific regulative obligations to the communal are made explicit: punctuality and participation.

There are three aspects of the instructional discourse are unusual. First, students are given the opportunity to practice speaking aloud grammatically correct, full English sentences by reading from the textbook. The teacher also repeats the sentences, so students listen to the language. The sentences are then written into their notebooks. There is greater engagement in language-learning processes (speaking, reading, listening, writing) than in most lessons.

The second notable instructional feature of the lesson is the linkages between theory and application, know-that and know-how. The textbook clearly sets out the language concepts. It contains a table of the different types of conjunctions – coordinating, subordinating and correlative conjunctions. Similarly, the function of connectors, as signalling cause and time, or providing a contrast, is clearly set out in a set of bullet points. During the activity, the teacher establishes a relationship between the theory presented in the textbook and how students join the sentences. In other words, she structures the use of theory to consider choices made in joining the sentences and shows how to use the grammar theory to judge whether a response is correct or incorrect. For example, in the first task (referred to below as "number one"), a number of students have connected the sentences "You have arrived late" and "you have not completed your homework" with "however". With reference to the textbook, the teacher explains why this is incorrect. She starts by reading the theory which describes when one would use a particular connector:

> T: [reading from the textbook] Secondly, give a different or opposite idea or contrast.
>
> T: When you are asked to compare and contrast, what are you expected to do? Contrast means what? It says there [reading] Give a different or opposite idea or contrast. So, contrast means what?
>
> L: Different
>
> T: Different, yes, good. [teacher and learners click to express approval]

T: So, if the question asks you to compare and contrast, that is what you must look for.

T: [reading] Give an opposite idea or contrast e.g., however.

T: So, when you use 'however', then it will be because you are giving a different or opposite idea or contrast.

T: [reading] e.g., however, nonetheless, nevertheless, otherwise, on the other hand, whereas, while, yet

T: So, some of you tried to give those kinds of connectors that give a different or opposite idea, whereas number one ['You have arrived late' and 'you have not completed your homework'] does not require that set of connectors for number one.

In each case, there is explicit deferral to the textbook and the set of rules therein to determine the appropriate response ("look at the notes on the bullets there"). This highlights a third aspect of the instructional discourse suggestive of epistemic lift. Knowledge about English is presented as systematic, ordered and complete – a formalised system of specialised knowledge that is explicit. The teacher, shifting between the grammar rules, the task and students' realisations, connects the formal meaning system and students' appropriate use of that system.

Deference to an authoritative text (the textbook) was unusual in most of the lessons we observed, where textbooks were rare, and inaccuracies in the content presented were very common. In this case, both regulative and instructional features of the lesson (especially the use of text) made the interactive and knowledge expectations of the pedagogy explicit and stable. Myhill et al. (2012) have shown that grammatically informed talk contributes not just to knowledge but also to improved writing. The lesson thus potentially constructs a bridge between the domain-specific knowledge (of grammar) and the processes of (here) speaking and (later) writing.

Epistemic lift in a Mathematics lesson

The following Grade 10 mathematics lesson in School E illustrates the epistemic lift indicator: "teachers providing structured opportunities for learners to engage in practices that are aligned to the discipline". The particular instance exemplifies how proof functions in Mathematics. Situated in an Eastern Cape city, School E is characterised as a high-fee-paying and high-performing school. The Grade 10 class is classified as a small class (about 25 learners) in the sample that we observed.

The lesson starts with the teacher introducing the learners to a new topic – Euclidian geometry. All the learners take out their notebooks and textbooks without being instructed to do so by the

teacher, suggesting that this regulative feature of classroom practice has settled into a routine for learners.

The teacher revises Grade 9 geometry, specifically lines and angles, properties of triangles and congruent triangles. This appears to be the first geometry lesson for the year, given that geometry is scheduled for the third term in the Annual Teaching Plans (DBE, 2024). The teacher directs questions to the whole class with learners tending to shout out the answers to the teacher's questions. The lesson exhibits a communalised regulative discourse focused on a communal production rather than on individual learner's understanding. The instructional discourse unfolds through teacher-directed exposition and question and learners' participation is mainly in the form of responses to the teacher's questions. We turn to a discussion of a worked example which requires showing that two triangles are congruent (see Figure 2).

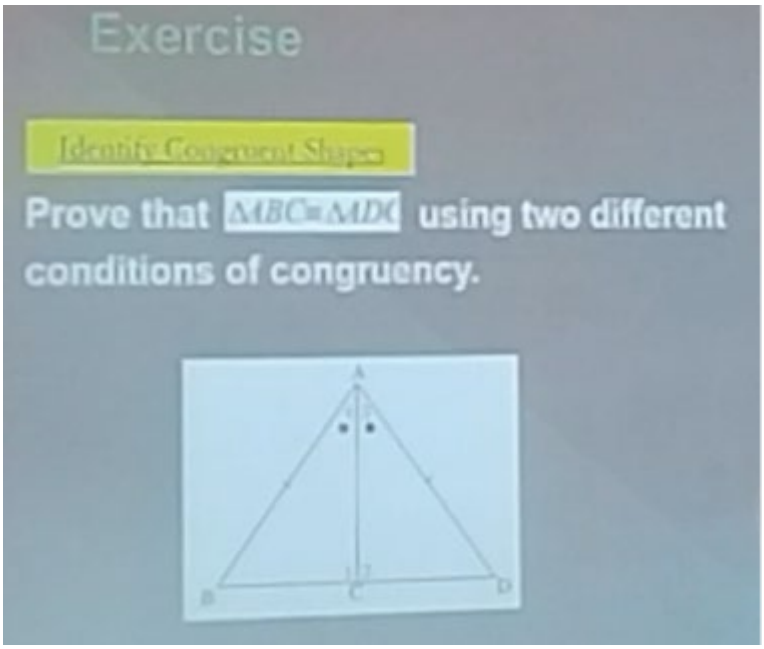

Figure 2. Extract from slides used in School E Grade 10 mathematics lesson

Having already listed two equal parts of triangles ABC and ACD, that is, AB equals AD and angle A_1 equals angle A_2, both of which are marked as equal in the diagram shown in Figure 2, a learner states that an angle is 90 degrees (referring to angle C_1 or C_2). The teacher's interaction with the learner is shown in the transcript below.

L: ninety degrees.

T: Ooh! How do we know it's ninety?

L: Cos it's perpendicular.

T: How do you know it's perpendicular?

L: [inaudible]

T: Ok, so again, remember you cannot assume anything in Euclidean geometry. If I can't prove it or it is not given, do not assume it. It brings us back to the ugly word that Mxolisi said, if you assume something, it makes an ass out of you and me, hey. A S S U M E [spells "assume"]. You and me. Remember. So, do not assume. Right. Let's try again. I know it looks like C one and two are ninety. It's going to be ninety because I am proving congruency, but I can't assume that.

L: but we know.

T: How?

L: Because, Sir, let's remove the line in the middle right. Then we left with the big triangle, right. We are told the two sides are equal.

T: Ok.

L: When we put the line [indistinct], so I know it is ninety. There you go.

The teacher highlights the importance of not making assumptions and of justifying statements with reasons. The use of justification and proof is central to mathematics and an important practice which learners must be inducted into. A proof, in this case a congruency proof, entails both know-how and know-that. The know-how refers to knowing that to prove triangles congruent, one has to show that three corresponding aspects of the two triangles are equal. The know-that comprises a constellation of concepts, e.g., the cases of congruency, definitions of geometric objects and geometric propositions. It is possible to produce a proof that uses incorrect geometric propositions to support a correct statement (see Jaffer, 2023). The transition to proof is a key curriculum shift from the Senior phase to the FET. Up to the Senior phase, proof is absent, and the approach to geometry is inductive. Geometric results are merely asserted or verified inductively (see Davis et al., 2022). In FET, learners are expected to move to a more deductive treatment of geometry where proof of theorems is required but also problems involving proof are introduced more explicitly.

The learners appear unconvinced, claiming the angle is 90 degrees for various reasons, none of which are correct. One learner reasons that angle C_1 is 90 degrees because the two sides of the triangle ABD are equal, which shows a correct value for the angle with an incorrect reason or

proposition. The learner's reason or proposition does not have a mathematical basis. So, the learner's propositional knowledge is faulty.

The teacher proceeds to assist learners in proving that the two triangles are congruent, pointing out that AC is a common side or that angles B and D are equal because triangle ABD is an isosceles triangle. The teacher thus directs learners' attention to the correct propositions that would allow them to prove that the two triangles are congruent with the correct propositions.

Given the confusion displayed by learners who still seem convinced that they can claim that angles C_1 and C_2 are both 90 degrees, many on the basis that it looks like a right-angle or the use of faulty propositions, the teacher adds the question, "Show that angle C_2 is 90 degrees" to the problem, to illustrate how proof works in geometry. The teacher adapts the lesson due to learners' confusion. He guides the learners to recognise that angles C_1 and C_2 together add up to 180 degrees, and because the triangles are congruent, angles C_1 and C_2 are equal, leading to the conclusion that angle C_2 is 90 degrees. It is clear that the teacher is aware of the need to focus attention on proof and of the curriculum shift in Grade 10.

Discussion

The exemplars show instances of opportunities for epistemic lift in three teacher-directed, communalised lessons. Three discussion points arise from these exemplars. The first is that we noted only glimpses of "epistemic lift" across the 99 lessons observed in the study; the second is the subject-specific nature of the epistemic lift lens; and the third is the central role of textbooks in providing structure to lessons and thus supporting opportunities for epistemic lift.

We drew on the concept of epistemic lift to identify indicators of how teachers might emphasise connections in their teaching, both within and between concepts and between concepts and context. Even with this lens, we found only glimmers in a few examples, as described above. However, these do show that opportunities for epistemic lift are possible in teacher-directed classrooms if teachers make knowledge/epistemic connections explicit for learners. It is possible that teachers could learn to make these connections more explicit if this were modelled and taught in initial teacher education and professional development courses.

The indicators of epistemic lift are generic and must be interpreted subject-specifically, as they do not work identically. The idea that different content can be used to teach concepts makes

sense in a subject like history, but not in mathematics, where the distinction is not useful. For example, in a topic like linear equations, the content and concept are the same. In all school subjects, procedural knowledge cannot exist without propositional knowledge, but this relationship is perhaps more closely entwined in mathematics and frequently remains tacit in English.

In the history classrooms we observed, teachers were more likely to make connections between first-order knowledge (content and concepts) than to engage with second-order knowledge. There were very few examples of teachers making the second-order concepts of chronology, cause and effect, significance, or evidence explicit (Bertram, under review).

In all three classrooms, we observed teachers making inferential relationships. The English teacher does so when she clarifies the principles for using connectors as outlined in the textbook. The history teacher does so when highlighting how to make inferences from the key provided with the map. In English and history, textbooks offer the potential to achieve epistemic lift. While the use of textbooks in classrooms was vilified in the early years of curriculum reform (Curriculum 2005), the state has more recently promised to provide textbooks to all learners. In our full sample of classrooms, textbooks were present in most history classrooms and in very few English classrooms. Generally, they provided the basis for a more structured lesson. However, the opportunities for epistemic lift depend on the quality of the textbook, how it makes connections and inferences clear, and how it is used.

Conclusion

In conclusion, we argue that focusing teachers' attention on opportunities for epistemic lift is appropriate for the regulative discourse of teacher-directed, South African high school classrooms. Epistemic lift focuses on pedagogy that develops discipline-appropriate inferential connections and provides structured opportunities for learners to engage in practices aligned with the discipline. We have shown how this need not necessarily occur through dialogue and discussion, or individualised relations, but can be evident in teacher-directed, textbook-centred instruction.

The idea of epistemic lift is, of course, also normative, but it is not reliant on a progressive regulative classroom discourse. We believe that it provides some insight into how teachers can

improve their pedagogy within the existing regulative discourse – which is communalised – and the instructional discourse where teacher talk is dominant. However, it does require teachers to have deep knowledge of both the substantive and syntactic aspects of their subject and to make meaningful connections for the particular learners in their classrooms. This is more easily achieved by teachers who are familiar with the concepts and content that make up a subject's systems of meaning (Winch, 2013).

Where this knowledge might be fragile, the productive use of good textbooks could provide critical support. It is important that textbooks make conceptual connections clear and that textbook activities provide practice opportunities that are aligned to the discipline.

In both initial teacher education and the professional development of practising teachers, courses could focus on how teachers can create opportunities for epistemic lift. Instead of focusing only on pedagogical strategies, teacher development needs to also focus teachers' attention on making explicit connections between concepts. Further, they could consider how to provide learners with opportunities to connect discipline-appropriate "knowledge-that" and "knowledge-how". This could shift visible pedagogy to radical visible pedagogy, where teachers and learners engage explicitly with making discipline-appropriate inferential connections within a familiar social form that is teacher-directed and communalised.

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