Analysing pedagogy: visibility and meanings

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Abstract

The pedagogic practices of teachers are multiple and varied. These variations have been conceptualised by Bernstein (1996, 2004) as two generic types of pedagogy – visible and invisible – each indicated by either explicit or implicit regulative and instructional criteria. The pedagogic practice of grade 11 geography teachers, in middle and working class schools, was observed, audio recorded and analysed according to the indicators of visible and invisible pedagogy. Deductive data analysis was undertaken and resulted in qualitatively different lessons being described as illustrating visible pedagogy. The description, clearly not justifiable on empirical evidence, necessitated an analysis that would illuminate what differentiated the lessons. Bernstein's notion of "ideal universe of meaning" (Bernstein, 2000, p.27) indicated by the systemic functional linguistic concept of co-extensions of meaning (Halliday and Hasan, 1991) framed the analysis of what meanings were being mediated. The analysis of co-extensions of meanings that resulted in a disaggregation of visible pedagogy into conceptually extended and less extended modes of practice enabled an empirically valid description of the pedagogic practice of the teachers. The paper suggests attention to what meanings are mediated through pedagogy in addition to an analysis of visibility of pedagogy.

Introduction

Critical sociological perspectives highlight social class inequalities in the performance of students, together with gender and race inequalities, as the main obstacle to the compelling categorical societal imperative of equity and social justice. These inequalities arising from social sources such as pedagogic practices are misrecognised for natural inequalities (Bourdieu, 1991). Bourdieu (1974) pointed out that 'arousing pedagogy' that piques the interest of students who then have access to social resources outside the formal pedagogic context to pursue those interests further advantages the middle class learner. Its alternative 'universal pedagogy' would meet the needs of all students (Bourdieu, 1974). Bernstein (2004) argued that 'invisible pedagogy' privileges learners from middle class backgrounds. Given the racialisation of different social classes within the South African context, with learners from working class backgrounds being predominantly Black learners, an analysis and understanding of pedagogic practices that reproduce such social

inequalities are imperative if equitable learning experiences are to be provided for all learners.

With the dismantling of apartheid the first post-apartheid school curriculum, Curriculum 2005 (C2005) envisioned change "of a scale . . .unparalleled in the history of curriculum change" (Harley and Wedekind, 2004, p.195). One of the radical changes, amongst integrated knowledge and outcomes-based education, was a shift to open-ended or learner-centered pedagogy. Open-ended teaching is associated with progressive learning, constructivism, active learning, situated cognition and child-centred pedagogy (Christie, 2008) that places the learner as active and self-regulating and the teacher as a facilitator of student learning. The diverging approaches to pedagogy are based on diverging assumptions of the student and the teacher (Bernstein, 2000).

According to Bernstein (1996, 2000) progressive pedagogy is underpinned by the concept of competence. Bernstein argues that the concept of competence that emerged in the social and psychological sciences in the 60s dominated the pedagogic recontextualising field. The social logic of the concept competence is that the pupil is viewed as competent, active and creative in the construction of knowledge, as self-regulating and that learning is a tacit invisible act that cannot be readily modified by explicit public regulation. It thus follows then that hierarchical teaching social relations and visible transmission of epistemic criteria are seen as disrupting the learning process. Hence, symmetrical power relations between teacher and learner are advocated with the teachers function seen as largely invisible and not going beyond facilitation. At the opposite side of the pedagogic spectrum is structured instruction, which is associated with direct instruction, mastery learning, and explicit teaching that are actively directed by teachers (Christie, 2008). In terms of the logic being developed here, structured instruction would be aligned with high visibility of pedagogy in mediating epistemic and social criteria.

Based on the premise that the essence of pedagogy is the transmission of epistemic and social criteria, Bernstein (2004) argues that a key distinguishing feature of pedagogic types is the visibility of epistemic and social criteria to be taught in the pedagogic practice. On the basis of visibility of criteria Bernstein distinguishes between two generic types of pedagogy – visible and invisible – each indicated by either explicit or implicit regulative and instructional criteria respectively. Invisible pedagogies are not neutral but advantage learners from middle class backgrounds. Bernstein highlighted the significance of visible pedagogy that makes epistemic criteria to be learned highly visible as crucial for the success of learners from working class backgrounds. This view

assumes that the problem lies with visibility of criteria and not with the criteria themselves. Such a view is tenable in the British context where the "message being transmitted was tolerably the same" (Hugo, Bertram, Green and Naidoo, 2008, p.31). However, in developing contexts as in historically disadvantaged classrooms in South Africa, where the assumption that the 'message is tolerably the same' may not hold, the inequality in learner performance may also be related to the quality of the knowledge criteria being made visible. A similar point has been made by Hugo *et. al.* (2008) who found qualitatively different lessons – 'excellent' and 'boring twaddle' – analysed according to a classification and framing framework (Bernstein, 1996) coming out 'identical'.

Notwithstanding the above point that Bernstein's concepts have limits regarding the 'quality of the message' (Hugo *et. al.*, 2008), Bernstein's conceptualisation of pedagogy in terms of 'visibility' of epistemic and social criteria provided a multi-dimensional, inter-connected set of conceptual tools, to analyse pedagogic practices in a systematic way. A theoretically driven analysis of pedagogy becomes more important in a context where very few studies of pedagogy are driven by a theory of pedagogy (Ensor and Hoadley, 2004) but by common-sense descriptions or ideological commitments to teacher or learner centred pedagogy.

The paper begins with analysing Bernstein's conceptualisation of pedagogy, followed by a description of its operationalisation for the analysis of pedagogic discourse, and then proceeds to present the results of the analysis. This is followed by a secondary analysis of the knowledge criteria themselves.

The visibility of pedagogy

Bernstein (2004) argues that the essence of any pedagogic practice is to evaluate whether the regulative and instructional criteria being mediated have been learned or achieved. The regulative order refers to conduct, character and manner in the pedagogic context and the instructional order refers to knowledge and intellectual skills – for example, how to solve a problem, or produce an acceptable piece of writing. Pedagogic practice, according to Bernstein is constituted by three rules – hierarchical rules, sequence/pace rules and criterial rules – that are either visible or invisible. In visible pedagogy the rules of the regulative and discursive order – hierarchical, sequence, pace and evaluative criteria – are explicitly transmitted whereas in invisible pedagogy

these rules are largely implicit. Any pedagogic practice may be analysed in terms of how visible or invisible the criteria are – whether what counts as valid knowledge, language, attitude, value, conduct, posture is clearly visible or invisible. In terms of the theory, whether the intended criteria have been learned depends largely on whether they are visible or made explicit during teaching. Bernstein notes that the two generic forms of pedagogy – visible and invisible – manifest in a variety of modes of practice.

The regulative order is achieved through the hierarchical rule that indicates that the appropriate relationship between teacher and student is hierarchical. Hierarchical rules refer to the intrinsically asymmetrical power relation between the teacher and the student. Given that the pedagogic relationship is essentially asymmetrical and hierarchical, what varies is the visibility of the power relations underpinning the relationship. When hierarchical rules are implicit the power relation is masked or hidden. In forms of progressive pedagogy that claim symmetrical power relations various strategies are used to disguise, mask or hide the asymmetry. When hierarchical rules are explicit – then the power relations are clear – and there are explicit subordination and super-ordination. Furthermore, the hierarchical relationship is viewed as a condition for pedagogic practice.

Sequencing rules refer to the temporal ordering of knowledge – that students are expected to learn specified competences in the time allocated. The sequencing rules may be explicitly or implicitly controlled by the teacher. Where sequencing rules are explicit they are visible and where sequencing rules are implicit they are invisible. In forms of progressive pedagogies students are allowed greater control over the sequence of their texts – this is an example of implicit sequencing rules. When the sequencing rules are explicit the teacher makes explicit the standard competencies expected of the learner within a specified period of time. Sequencing rules imply pacing rules. Pacing indicates the rate of acquisition – how much has to be learned in a given amount of time.

Criterial rules refer to the practice of evaluating students' texts – oral or written in terms of what counts as legitimate knowledge and social relation in the pedagogic context. Criterial rules refer to the instructional (knowledge and skills) and regulative (behavioral) criteria that the learner is expected to learn and apply. The criteria enable the acquirer to understand what counts as legitimate or illegitimate text be it knowledge based or a social relation. Criterial rules may be explicit and performance based or implicit and competence based. When performance based the learners text is evaluated

according to an external common standard and the student is made aware of what is missing in the text. In addition the emphasis is on the performance of the child – upon the text produced by the child and the extent to which they meet the criteria. Visible pedagogies emphasise transmission-performance. The aim is to enable a close matching of the student's text to an external common standard. The focus is on an external gradable text.

Invisible pedagogies emphasise acquisition-competence. The emphasis is on the competence of the child – upon what is present rather than absent and what is possible in the future. Invisible pedagogies are 'less interested in matching the acquirers text against an external common standard' in other words the 'ideal universe of potential meanings'.

The two generic types of pedagogy are summarised in table 1 below:

Table 1:   The basic types of pedagogy

Type of pedagogy	Visible pedagogy	Invisible pedagogy
Hierarchical rule	Explicit	Implicit
Sequencing rule	Explicit	Implicit
Pacing rule	Explicit	Implicit
Evaluative criteria	Performance based and explicit	Competence based and implicit

Data collection and analysis

This paper arose from a larger research project focused on studying the pedagogic practices of geography teachers in six grade 11 classrooms, through the lens of Bernstein's concept of visible and invisible pedagogy. Fieldwork encompassed non-participant observation and video recording of geography lessons that were transcribed. For this paper, two lesson transcripts were analysed in detail and relevant excerpts from the remaining transcripts have been cited to illustrate claims being made. While the topic 'the impact of humans on the oceans' was the same and the regulative and instructional criteria were visible the lessons differed significantly in terms of quality of knowledge criteria being mediated.

The transcripts of the lessons were divided into conceptual sequences – a group of sentences that address an aspect of the topic differentiated from

another conceptual sequence by another but related aspect. For example in the first lesson the first conceptual sequence demarcated was – the teacher began the topic by stating it and analysing it and clarifying its meaning – the 'impact of humans on the oceans' and then explaining the word 'impact' and differentiating it from 'exploiting' the ocean. The next sequence entailed identifying and discussing the first human impact on the oceans. Transcript A was divided into 11 sequences and transcript B was divided into 12 sequences. The conceptual sequences were analysed according to: whether the hierarchical rules were explicit or implicit; whether the sequencing, pacing and evaluative rules were explicit or implicit; and whether the evaluative criteria were explicit or implicit and performance or competence based.

The analysis of pedagogic discourse of teachers through the lens of Bernstein's visible and invisible pedagogy enabled study of an essential aspect of pedagogy – the 'visibility' of instructional and regulative criteria that are to be learned. What the lens did not illuminate, however, was what meanings were being transmitted, resulting in qualitatively different lessons both being described as visible pedagogy as the regulative and instructional criteria were explicit. The description, clearly not justifiable on empirical evidence, nor on moral grounds, necessitated an analysis that would illuminate what differentiated the lessons.

This paper presents a double analysis using two sets of analytical frameworks that together provide a realistic and valid description of the pedagogic practice of the teachers. It thus argues for disaggregation of visible pedagogy into more and less co-extended epistemic criteria. In the section below the application of each analytical criteria to specific conceptual sequences in the lessons is described, and then in the next section the overall results of the analysis are presented.

Hierarchical rule

This rule refers to the visibility of the power relation between teacher and learners that underpins the pedagogic interaction. The excerpt below, from lesson B, illustrates what was coded as hierarchical regulative relations between the teacher and students:

T: OK sit down. Come on boys, I would like you to get out the notes that I gave you yesterday. These notes: the living oceans. Get them out. Come Mohammed, sit down.

The teacher was visibly in charge of the learners' behavior as she stood in front of the class and instructed students to 'sit down,' 'to get out their notes,' and then directly addressed an errant student 'come Mohammed, sit down'. In both lessons and for the greater part of the lessons, visible hierarchical relations were evident.

Instructional rules

The conceptual sequence below was coded as illustrating visible sequencing, pacing and evaluative rules.

T: So, OK guys. So, from these oceans we get a lot of things, ne? There are a lot of activities that are taking place in those oceans ne? Is that so? So you know it's like um people do a lot of things. They do um fishing. Some of them they build the houses next to the oceans, ne? But some of these things ne, they have negative and positive impacts. Are we together?
Alright, so what we are going to look at is the negative impact on these oceans. Are we together?
So that is our topic that we are looking at today. [Writes topic on board]. Right. . .um. . .so our topic is the impact on. . .oceans. So when we are looking at impacts we are basically looking at some of the things that can affect us positively and negatively. Can you please tell us some of the things (that effect) the ocean positively and negatively?
L: Over fishing
T: Yes, we can talk of over-fishing. How does over-fishing affect these oceans? How does over-fishing affect these oceans? Does over-fishing affect these oceans?

In the above excerpt the teacher controls the sequencing of knowledge – she commences with activities that impact the oceans in negative and positive ways, and then frames the lesson in terms of focusing on 'looking at the negative impact of humans on oceans', she then asks students 'can you please tell us some of the things that impact the ocean positively or negatively' to which a student responds 'overfishing'. The sequencing is being visibly controlled by the teacher – the fact that the sequencing is not sequentially coherent – as the teacher tends to go backwards to positive and negative impact on the ocean after telling students earlier on that negative impacts on the ocean will be looked at – is a different point to its visibility.

The excerpt also illustrates visible pacing by the teacher. Students are being asked questions and answers are expected immediately. The teacher explains that the lesson will focus on 'the negative impact on the ocean' and then establishes 'over-fishing as a negative impact on oceans'. The fact that students were not given much opportunity to question or provide full explanations, that would enable them to exercise control over pacing, is yet again another matter from the point that the teacher was providing very visible pacing rules. Similarly the excerpt below also illustrates visible pacing by the teacher.

T: OK, I asked you to read through these notes yesterday. So basically what I want you to do now is to quickly summarise what you gathered from the notes. What information did you find? What did you understand from the notes? We are going to do a bit of brainstorming to see what you came up with?

The teacher tells learners that she wants them to 'quickly summarise' and with two consecutive questions and a statement: 'what information did you find? What did you understand from the notes? We are going to do a bit of brainstorming to see what you came up with' she makes clear that responses were expected immediately. Through a series of questions the teacher explicitly paces what students need to attend to.

The evaluative rules were clearly visible as the teacher evaluates the student's response of 'overfishing' with 'yes, we can talk of over-fishing'. The excerpt below illustrates visible evaluative rules.

T: OK, what did you notice was the most important fact about the oceans?
L: The effect
T: OK, the effect that it has on us. What do we mean by the term effect? When I say that the ocean has an effect on us – what does that mean?
L: The influence
T: We want to look at the influence it has on our lives. Whether the influence is positive or negative doesn't really matter. The important fact is that if something affects you – whether it is in a positive or a negative way.

The teacher establishes from learners that the notes were about the effect on the oceans. She then proceeds to get students to think about the term effect. She then makes learners aware that influence and effect may be positive or negative.

Performance based evaluative criteria

The conceptual sequence below illustrates performance based evaluative criteria. Firstly, the teacher provided explicit evaluation of learner's responses in terms of 'right' (three times) and 'Ok' (two times). Secondly, the teacher conveys acceptability of student's responses by repeating the correct responses, for e.g. 'remove salt' and 'electricity'. Thirdly, the teacher expands on students responses by developing them further, for example, 'Remove salt to make fresh water' and '**OK**, literally they use wave action'.

T: **Right,** what else does the ocean provide us with?
L: Goods and the water cycle.
T**:**   **OK,** so the water cycle. So pretty much it contributes to evaporation. Evaporation contributes to high rainfall and precipitation. Nicholas?
L: Electricity.
T: Electricity, **right** some people get electricity from the ocean. OK, hydro electric energy.   Hydro – coming from water. Does everyone know how they make hydro electrical energy from sea water?
L: They put turbines in the waves.
T: **OK**, literally they use wave action. As the wave comes in it goes into a chamber, builds up pressure and then we produce hydroelectricity. Nice, cheap, efficient energy – a cheap way. What does de-sal-in-ate mean?
L: Remove salt
T: Remove salt to make fresh water. **Right,** so basically when you read the article yesterday, this is what you should have summarised from the article. Now what you do to summarise the article is you make yourself a little spray diagram so that you can see the **key words, the key terminology**. I keep on saying to you that when you study **you must study terminology**. So, when I speak about trade, that words must register in your head and trigger off these five ideas – they should come into your mind. So, if you see the word trade, tourism and economics should come to mind. What other types of inputs are there?

Fourthly, explicit direction is given to learners in terms of what 'they ought to have got from reading the notes' and in terms of the high value of 'key words and key terminology'.

Each conceptual sequence was analysed in the same manner as above and collated. The results of the collation are presented in table 2 below.

Results of primary data analysis - visibility of criteria

The analysis of each implication sequence was collated and tabulated (table 2 below).

Table 2: Visibility of criteria in lesson A and B

Analytical criteria	Lesson A (No. of sequences analysed = 11)	Lesson B (No. of sequences analysed = 12)
Hierarchical rule	Explicit in 11	Explicit in 12
Sequence	Explicit in 11	Explicit in 12
Pace	Explicit in 11	Explicit in 12
Evaluative criteria	Explicit - performance mode in 11	Explicit - performance mode in 12
Visibility of pedagogy	Visible	Visible

The hierarchical relationship between the teachers and students were explicit in all 11 sequences in lesson A and all 12 sequences in lesson B. Both teachers were visibly in charge of the instructional and regulative discourse in both lessons. In both lesson A and B, the instructional criteria were made explicit, the teacher was visibly in control of the communication, and the power relations were explicit. The sequence of the lesson was explicitly controlled by the teacher, so was the pace. The evaluation criteria were also explicit, the teachers affirmed students' responses by repeating them or with an 'ok' 'right' 'good' before they moved on. What differentiated the lessons was the extent to which the evaluative criteria were performance based – as teacher B extended and developed students' responses and pointed what meanings they ought to have gleaned from reading the notes.

The pedagogic practice of both teachers illustrated the indicators of visible pedagogy. Notwithstanding this similarity the starkly evident difference between the lessons had not been illuminated by the analytical framework used. This necessitated the analysis of the meanings or criteria themselves in addition to their visibility.

Ideal universe of meaning and co-extensions of meaning

Thus far the analysis applied Bernstein's model of pedagogic practice or visibility/invisibility of criteria – without explicit attention to the content of the practice in terms of the knowledge structure of geography. In chapter 2 of his book *Pedagogy, symbolic control, identity* on the pedagogic device (Bernstein, 2000) Bernstein invokes the notion of an "ideal universe of potential pedagogic meanings" that are communicated in "ways to restrict or enhance their relationships" (Bernstein, 2000, p.27). The ideal universe of meanings for Bernstein emanates from the primary knowledge context where a discourse such as physics is produced. It refers to the intellectual field where new ideas are selectively created, modified or changed. The pedagogic device has:

> . . . internal rules which regulate pedagogic communication. Such pedagogic communication acts selectively on the meaning potential. By meaning potential we simply mean the potential discourse that is available to be pedagogised. The pedagogic device regulates fundamentally the communication it makes possible, and in this way it acts selectively on the meaning potential. The device continually regulates the ideal universe of potential pedagogic meanings in such a way as to restrict or enhance their realisations (Bernstein, 2000, p.27).

Analysis of the above quote shows that the actual curriculum (Stenhouse, 1983) that includes the teachers pedagogic communication in the classroom like the intended curriculum is a selection from 'the ideal universe of meanings'.

Venkat and Adler (forthcoming) distinguish between the enacted and intended mathematical domains – the intended knowledge domain has validity within the mathematical community whereas the enacted domain refers to 'unfolding operational activity in [empirical] episodes'. In a similar way it is possible to distinguish between domain specific knowledge and the actual knowledge being taught. The actual knowledge mediated by the teacher might be elaborated beyond the intended domain or fall short of it.

That is, that in any topic to be taught in any subject, in this case Geography, it is possible to distinguish between what the teacher communicates, the enacted domain, and the ideal universe of meanings, the intended domain – the intellectual field where the subject discourse is produced. What teachers communicate may be more aligned with the ideal universe of meaning or less aligned with it. The result is that what content is communicated enhances or restricts meanings, in relation to the ideal universe of meanings.

Martin (2006) describes the structure of physical geography as vertical i.e. conceptual meanings are vertically co-extended. Co-extensions are content words or lexical items in a field of meaning. According to Halliday and Hasan (1991) co-extensions are produced by four types of meaning relations – the use of synonyms, antonyms, hyponyms and meronyms. Synonymy refers to the use of words that are similar in meaning to the key term that evoke identical experiential meaning. Antonymy refers to the use of words that mean the opposite that also evoke identical experiential meaning. The classification of concepts or hyponymy refers to explaining a concept by classifying it into its sub-types from a general class to its sub-classes where the focus is on general-specific relations, for e.g. the concept rock that is general and is classified into sub-types of rocks. The classification of concepts enhances structural depth in a text. The composition relations or meronymy (Halliday and Hasan, 1991) refers to part-whole relations, for e.g. fingers are parts of a hand.

A topic like 'the impact of humans on the oceans' could thus be mediated in more or less extended ways. By analysing the co-extensions in pedagogic discourse in Geography lessons it becomes possible to distinguish between co-extended and less co-extended discourse. Each conceptual sequence was then analysed in terms of the concept of co-extension of meaning.

Visible but weakly co-extended meaning in lesson A

The primary analysis showed that in lesson A a visible pedagogy is in operation. In this section an excerpt from lesson A is used to illustrate weakly co-extended meaning being legitimised. The first negative impact on the oceans 'overfishing' is established and elaborated in terms of leading to food shortage and extinction of the source before the teacher moves on to other factors impacting the oceans.

T: Right. . .um. . .so our topic is the impact on. . .oceans. So when we are looking at impacts we are basically looking at some of the things that can affect us positively and negatively. Can you please tell us some of the things that impact the ocean positively and negatively?

L: Over fishing

T: Yes, we can talk of over-fishing. How does over-fishing affect these oceans?
      How does over-fishing affect these oceans? Does over-fishing affect these oceans?

L: Yes.

T: Yes, it destroys our food in the oceans. They are destroying our fishes, ne? Because it will come at a time when these fish are extinct. It will come at a time when there are no more fish. This over-fishing becomes an impact. Anything else? Yes?

L: [Inaudible response]

T: Speak up please.

L: Littering beaches.

T: Yes, Littering of beaches. Littering beaches. What else?

L: Ocean pollution.

T: Um, ocean pollution. Yes, we can put up ocean pollution and under ocean pollution we can also branch up littering of . . .beaches. Are we together?

L: Yes.

T: Yes.Yes. What else?

L: Oil spills.

T: Yes, we can talk about oil spills and leakage. Oil spills and leakage. Oil spills and leakage. We can also classify it under pollution, ne? We can classify it under pollution. Any other contributions? Yes, Zuma?

L: Sewerage.

T: OK, sewage. So, we can say sewerage. So, we can say sewage. We can put it under pollution and those plants? Ne? Yes, we can also put it under leakage.
      We can put it under leakage. Any other things?

L: Dumping of toxics chemicals.

T: Yes, dumping of toxics chemicals. Dumping of toxics chemicals. Dumping of toxics chemicals. Yes. Are we together? Any other things?

L: The release of industrial waste.

T: Yes, the release of industrial waste. What else?

L: Toxic waste by ships.

T: Yes, toxic waste by ships. We can also put under industrial waste 'cos it can be toxic. So, if we are saying they are toxic, we are saying to an extent they are poisonous. Are we together? So these are some of the impacts on. . .um. . .the impacts on. . .oceans.

The second negative impact – 'littering', was elicited and acknowledged but not co-extended. The dialogue took the form of 'what else?' the answer 'littering of beaches' and the response 'yes' before moving on to the next factor. Through similar questions and answers other factors such as 'pollution', 'sewerage', 'toxic waste' were elicited and acknowledged, without further elaboration or extension. One could describe the conceptual structure of this human geography lesson as less co-extended. The discourse was made

up of short questions, short or one word answers and then moving on to the next aspect.

In terms of classificatory meaning relations, the teacher establishes the types of negative impact on the oceans, such as overfishing and pollution and then further classifies pollution into its sub-types – 'littering', 'oil spills', 'toxic waste', 'sewerage', 'industrial waste'. The sequence illustrates lack of meaningful extension of each sub-type in terms of compositional extension of each type of pollution. For example, oil spills and their impact on the marine environment could have been further analysed.

Furthermore, across the lesson, from the teacher-lead whole-class discussion to the small group application activity at the end of the lesson and the homework set – there was a repetition of similar restricted meanings.

Visible and more co-extended meaning in lesson B

In lesson B there were greater co-extension of the terms and concepts that constitute the content of the section. In the sequence below, the teacher elaborates on the term 'impact' by establishing its synonymy with influence and its difference from exploit. That 'impact' and 'influence' could be positive and negative. Similarly the teacher employs synonymy to establish the meaning of the term 'exploit' as negative 'over-use' and 'damage'. In the sentence 'So when you exploit, you are over-damaging it. You over-use it' the teacher makes use of synonymy to enable understanding. This is an example of co-extending meaning. In the question 'what is the difference between the word impact and exploit?' the teacher directs students towards the specific meaning of the word 'exploit' rather than 'impact'. In the statement 'When I say exploit, I mean take advantage of the ocean and mismanage it' the teacher co-extends the meaning of the word 'exploit'. She then further extends the meaning of 'exploit' as negative impact and to include 'mis-management' of resources. In the text that follows the teacher moves into an explanation of 'non-renewable resources' in more subject specific terms – 'it means that a particular resource cannot replenish itself'.

T: Right, it says: What is the impact of humans on oceans? OK, once again, the word impact – what does that bring to mind if you read the word impact?

L: How it influences.

T: Right, how it influences. OK, what is the difference between the word impact and exploit? If you use the word exploit. . . Thomas?

L: Exploit is when you make use of something?

T: Yes, you make use of something. Would the word exploit come across as positive or negative?
      [Many learners] Negative

T: OK Milan, why is it negative?

L: 'Cos you're taking advantage of it.

T: When you exploit something you are taking advantage of it. It means that that particular resource cannot replenish itself. So when you exploit, you are over-damaging it. You over-use it. It cannot replenish itself within a given space of time. With the word impact, impact doesn't have to be negative. You can have a positive impact on the environment. So, when you look at the question, look at the diagram and say what impact it has on your environment – positive or negative?
      So what we are going to do now is we are going to look at how human beings exploit the ocean. When I say exploit, I mean take advantage of the ocean and mismanage it. The word mismanage should go with the word exploit. The only reason we use the word mismanage here is because nature provides us with enough natural resources. It is what we do with them, how we manage them, that is going to lead to exploitation. If we manage them correctly and sustainably, we will be able to manage the natural resources in the time frame given to us.
      OK, so that's another word that you need to look at when you look at exploitation – sustainable. So what does that word mean? What does sustainable mean?

L: Carry on.

T: The word has a very direct connotation to it. To sustain something. . . . To sustain your marks in Geography.

L: Carry on.

T: To keep it constant, to keep it going. So, how are you going to sustain the environment?

L: Good management.

T: Good, good management. That's the key to sustainability. If you manage something properly you can sustain it and therefore your impact is going to be positive, not negative.

Similarly, later in the discourse, the concept sustainable is introduced and analysed. There were a number of instances of co-extension throughout the lesson. In the excerpt below the teacher introduces the generation of hydro

electric power from the ocean and then elaborates by explaining how wave action is used to produce wave energy.

T: Does everyone know how they make hydro electrical energy from sea water?
L: They put turbines in the waves.
T: OK, literally they use wave action. As the wave comes in it goes into a chamber, builds up pressure and then we produce hydroelectricity.

Because co-extensions have been used more frequently in this lesson the conceptual structure of this geography lesson has been described as more co-extended, comprehensive, and deep.

The analysis of each conceptual sequence in the two lessons is tabulated below:

Table 3:   Co-extensions of meaning in the lessons

Criteria	Lesson A Number of conceptual sequence = 11	Lesson B Number of conceptual sequence = 12
Knowledge content	Less co-extended in 11	More co-extended in 10
Co-extensions	Less co-extended in 11	More co-extended in 10
Pedagogy	Visible – Less co-extended in 11	Visible – More co-extended in 10

In lesson A, restricted co-extensions characterised all 11 sequences. In lesson B, 10 of the 12 sequences were characterised by more elaborated and deeply co-extended content knowledge. Relating this conclusion to the first that both lessons were characterised by visible pedagogy – lesson A could be described as visible and co-extended through the use of co-extensions of meaning and lesson B as visible and less co-extended meaning relations.

Conclusion

This research applied Bernstein's generic types of visible and invisible pedagogy to observed pedagogic practice in two geography classrooms. Coding of data according to the indicators of visible and invisible pedagogy resulted in more co-extended and less co-extended lessons being

homogenously described as visible pedagogy. A 'pure' deductive analysis of the lessons in terms of visibility of epistemic and regulative criteria enabled the study of an essential aspect of pedagogy – the 'visibility' of instructional and regulative criteria that are to be learned but did not shed light on the quality of the epistemic criteria being communicated, resulting in qualitatively different lessons being described as visible pedagogy.

In terms of the theory drawn on, the focus on the notion of visibility takes one to one of the essences of pedagogic practice. The study shows that high visibility/invisibility of regulative and instructional criteria does not automatically translate into co-extended and less co-extended meaning. That both extended and restricted meanings may be very visible. It is argued that when an analysis of visibility of criteria is complemented with an analysis of the extent of co-extension of domain specific meaning, a more empirically valid description and analysis of pedagogic discourse is attained. The analysis of co-extensions of meanings resulted in a disaggregation of visible pedagogy into conceptually extended and less extended modes of practice. The paper suggests attention to the quality of meanings mediated in addition to an analysis of visibility of meanings being mediated through pedagogy.

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