Education Quarterly Reviews

Mwale, M., & Shumba, O. (2023). Exploring the Recontextualisation Process in Developing the Plant Biotechnology Course: A Bernsteinian Analysis. *Education Quarterly Reviews*, 6(2), 266-280.

ISSN 2621-5799

DOI: 10.31014/aior.1993.06.02.755

The online version of this article can be found at:
https://www.asianinstituteofresearch.org/

Published by:
The Asian Institute of Research

The *Education Quarterly Reviews* is an Open Access publication. It may be read, copied, and distributed free of charge according to the conditions of the Creative Commons Attribution 4.0 International license.

The Asian Institute of Research *Education Quarterly Reviews* is a peer-reviewed International Journal. The journal covers scholarly articles in the fields of education, linguistics, literature, educational theory, research, and methodologies, curriculum, elementary and secondary education, higher education, foreign language education, teaching and learning, teacher education, education of special groups, and other fields of study related to education. As the journal is Open Access, it ensures high visibility and the increase of citations for all research articles published. The *Education Quarterly Reviews* aims to facilitate scholarly work on recent theoretical and practical aspects of education.

ASIAN INSTITUTE OF RESEARCH
Connecting Scholars Worldwide

The Asian Institute of Research
Education Quarterly Reviews
Vol.6, No.2, 2023: 266-280
ISSN 2621-5799
Copyright © The Author(s). All Rights Reserved
DOI: 10.31014/aior.1993.06.02.755

Exploring the Recontextualisation Process in Developing the Plant Biotechnology Course: A Bernsteinian Analysis

Mafunase Mwale[1], Overson Shumba[2]

[1] Department of Mathematics and Science Education, The Copperbelt University, Kitwe, Zambia
[2] Centre for Academic Development & School of Mathematics and Natural Sciences, The Coppebelt University, Kitwe, Zambia

Correspondence: Mafunase Mwale, Department of Mathematics and Science Education, The Copperbelt University, Kitwe, Zambia. E-mail: mafunasemwale@yahoo.com

Abstract
The purpose of this study was to explore the recontextualisation of knowledge in the development process of the plant biotechnology course with an aim of understanding how knowledge is to be framed and classified in the course. The plant biotechnology course was developed for the students enrolled in the department of biological sciences. The course was also included in the curriculum for the students training to be teachers of biology in secondary schools in Zambia. The aim of any training is to prepare the students for their future profession. Therefore, a need to understand how the plant biotechnology course was developed in relation to meeting the objectives of a teacher training curriculum. Studies have indicated that, to effectively prepare the students to teach biology in secondary schools, the students need to experience a pedagogic practice characterized with both weak and strong framing and a weak classification between the discourses. The research question which guided the study was: How is knowledge recontexualised in the development process of the BT 440 course? Interviews were used to collect the data. Bernstein's classification, framing, recognition and realization rules were used to analyze and interpret the findings. An inductive approach was used to analyse the transcript. Atlas ti 8 was used to analyse the transcript. The findings of the analysis indicated that the analysis of the interview data has revealed that the control relations (framing) between the agents in terms of hierarchical rules, knowledge selection, sequencing, pacing and the evaluation criteria were all strongly framed (F+). In terms of the relations between discourses, the classification was weak (C-) in the inter-disciplinary, intra-disciplinary and in the inter-discursive relations, indicating a weak recognition and realisation of the text.

Keywords: Biology Education Students, Classification, Framing, Pedagogic Discourse, Recognition, Realization, Recontextualisation

1. Background to the study

The plant biotechnology course (BT 440) is one of the courses taken by students training to be teachers of Biology in secondary schools in Zambia. The development of the course has a great influence on how the course is to be taught and what content is included in the course (Bernstein, 2000). At the Copperbelt University (CBU), the BT

440 course is developed is one of the courses developed in the Department of Biological Sciences (DoBS). BT 440 course is designed for the students enrolled in the DoBS to meet the objectives of the programmes in the Department of Biological Sciences. The plant biotechnology course is not designed for the students enrolled in the Department of Mathematics and Science Education (DMSE). The lecturers in the DMSE are not involved in designing the BT 440 course. Yet the plant biotechnology course designed for the students in the DoBS is included in the programme for the biology education students who are enrolled in the DMSE.

2. Problem statement

The BT 440 course is designed by for the students enrolled in the DoBS. The development of the course was guided by the objectives to be attained by the students enrolled in the DoBS. The objectives to be attained by the students enrolled in the DMSE did not guide the development process of the BT 440 course yet the course is also taken by the biology education students enrolled in the DMSE. The objectives of training the students enrolled in the DMSE is to be able to teach the 5090 biology in secondary schools in Zambia. Bernstein (2000) clearly indicate that, the development of a course determines how a course will be taught and what content to be taught. In this situation, the course may not help to meet the objectives of training the biology education students.

3. Purpose of the study

The purpose of this study was to explore the recontextualisation process in developing the BT 440 course at the Copperbelt University in Zambia.

4. Research Question

The research question which guided the study was:
How is knowledge recontexualised in the development process of the BT 440 course?

5. Literature review

The literature review was focused on Bernstein's concepts which are relevant to this study. The concepts reviewed in this study are: recontextualisation, classification, framimg, pedagogic discourse. The production and the implementation of the pedagogic discourse involve a number of agents and agencies working at the different levels of the education system. Bernstein has called these levels as the fields of the pedagogic device which are: production field, recontextualisation field and the reproduction field. In each of the fields, there are agents working in the production, recontextualisation and reproduction of the knowledge. When Knowledge is produced in the production field, the knowledge produced is recontextualised in the recontextualisation field to become school knowledge. The three fields of the pedagogic device are hierarchically related in that recontextualisation can only take place if there has been knowledge production, and reproduction can only take place if there has been the production.

Each of the field has a number of agents working to produce the desired knowledge. Agents working in the production field are the intellectuals in universities and in research centres. It is from the field of the production that knowledge is selected to be recontextualised in the recontextualisation field (Hoadley, 2006; Luckett, 2009). In the context of this research this would mean that the production fields include the departments in the university in which knowledge is produced such as the Department of Biological Sciences (DoBS), Department of Chemistry (DoC) and the Department of Physics (DoP) and the other departments from which knowledge is selected to make a biotechnology course such as the plant biotechnology at Copperbelt University and the University of Zambia. Knowledge is also produced at the research centres such as the National Institute of Scientific Research (NISIR) and mount makulu research centre as some of the sites from which biotechnological knowledge is produced in Zambia. The knowledge produced in the production field is self-explanatory and get transformed as it gets recontextualised. The agents involved in the production of knowledge do not have time or resources to convert or translate the new knowledge into a form accessible to the non-specialists. Hence the translation of the produced

knowledge into a form accessible by non-specialists is done in the recontextualisation field of the pedagogic device. It is in the recontextualisation field that this study is positioned.

The recontextualisation field is mainly concerned with the production of the pedagogic discourse. It is the recontextualisation field which link the field of research (production field) to the field of practice (reproduction field). Hence an understanding of the recontextualisation will inform how the field of research relates to the field of practice (Luckett, 2009). The agents in the recontextualisation field are able to pedagogies the knowledge produced in the production field (Singh, 2002). Recontextualisation rules play a major role in having the specialist knowledge accessible to the learners.

The selection of the knowledge from the production field is guided by the rules of recontextualisation. It is through the recontextualisation rules that a discourse is moved from its production context/site to another context. When the discourse has been moved from the original context to new different sites where it gets recontextuslised it will no longer resemble the original discourse because it has been converted or pedagogised into a pedagogic discourse/pedagogic communication (Diehl et al., 2015; Wheelahan, 2005; Wheeler, 2009). This clearly tells that as knowledge is recontextualised, it is transformed and no longer looks like the original knowledge.

Recontextualisation (the making of school knowledge, for example, the curriculum knowledge) is a key element of Bernstein's theory of pedagogic devices (Weelie & Boersma, 2017; Hewllet, 2013; Wierdsma, 2012). Recontextualisation produces power relations in the process of selecting, de-locating and re-locating a discourse. It is through recontextualisation that a discourse or part of a discourse is selected, de-located and re-located in a new different context with other discourses. Therefore, recontextualisation refers to how knowledge produced at one site is recontextualised by curriculum designers at an educational institution such as Copperbelt University and reproduced by teachers/ trainers when they interact with learners. During this process of recontexualisation, knowledge is transformed (Bertram, 2008; Bibila, 2016; Reeves, 2006). The process of recontextualisation leads to the formation of a vertical discourse. The vertical discourse has two knowledge structures which are vertical structure or a horizontal structure. It is through recontextualisation that horizontal discourses are transformed to have a vertical structure. That is making the knowledge to be meaning in different contexts. Recontextualisation is more concerned with the transformation of knowledge when it is moved from one context to a new different context. The way knowledge has been recontextualised, determine the recognition and realisation rules of the school knowledge/formal knowledge as a vertical discourse (Singh, 2002; Singh, Thomas, & Harris, 2013). It is important that educators understand how the curriculum knowledge is sequenced and organised which could be achieved by analysing the pedagogic discourse. Analysis of the plant biotechnology course, will inform the pedagogic practices and the content to be transmitted and acquired. The focus of this study is to understand the pedagogic practices in a biotechnology course in a teacher education context.

The field of recontextualisation has two sub-fields, thus the official recontextualisation field (ORF) and the pedagogical recontextualisation field (PRF). Below I will focus the discussion on the two sub-fields of the recontextualisation field.

The official recontextualisation field (ORF) is the field which is dominated by government agencies and its officers. This field includes the government departments at national level, provincial level and at district level. The field also includes the researchers and the subject inspectors or the standard officers at the different levels of the nation who are the advisors. The ORF also include the people who are not specialists in the pedagogic discourse, such as the stake holders from industries. Stakeholders have interest in the education and that they could influence the state and the pedagogic practices (Bibila, 2016; Prayer-koro, 2012) . For this study, agents in this field could include the standard officers at national level, provincial level from the ministry of education, curriculum development centre, researchers from the research centres, stake holders, that are agents from the industries (Bernstein, 1990; Bernstein 2000).

The PRF consists of the people who are in the education such as the Universities, colleges of Education, examination boards such as the Examination Council of Zambia, textbook writers, specialised journals, and the

research foundations. In the case of this study, this field could include the lecturers in the departments, lecturers at school level, members of the Academic Development committee and the stake holders from industries.

The PRF has different degrees of autonomy. In some cases, the ORF has an influence on the PRF this is because the dominant ideology of the ORF get recontextualised into the curriculum. The influence the ORF has on the PRF varies from nation to nation and even within the nation with time (Bibila, 2016; Player-koro, 2012; Bertram, 2012). When the ORF has some influence over the PRF, it affects what goes on in the classroom practices. Hence what may take place in the classroom practices maybe an on-going struggle between government, government departments and Universities or schools (Bibila, 2016; Player-koro, 2012; Bertram, 2012). Therefore the pedagogic discourse which is appropriated in the classroom practices depend on the dominant ideology in the ORF (Enderstein, 2015).

Hewlett (2013) points out that the curriculum in higher education is tailored towards achieving the nation needs and the needed professions in the developmental needs. This situation demands that knowledge from the production fields be selected, relocated and delocated in a process called recontextualisation. In doing so, knowledge is transformed into a new discourse. The plant biotechnology course draws the knowledge from a number of knowledge sources. The process of selecting and pedagogising knowledge from the disciplines and creating a course like the plant biotechnology BT440, for example, is what Bernstein called pedagogic recontextualisation.

Bernstein used the concepts of classification and framing to understand, describe and characterize the rules of the pedagogic discourse. Classification is about the organisation of knowledge. Classification shows the relation in the knowledge. Strong classification is indicated when there is no relation in the knowledge and weak classification is indicated when there is a relation in the knowledge (Bibila, 2016; Mukute & Pesanayi, 2015; Bertram, 2008; Rose, 2014; Reeves, 2006). Classification helps to inform how much each curriculum subject is distinct or unique in the curriculum. Classification also shows how much the subjects are related to each other in the curriculum. It is the relationship between the subjects in the curriculum which is a concern for educators. Subjects are to be related when the classification is weak. On the other hand classification is strong when the subjects are not related. Classification is concerned with the strength of the boundaries between categories such as discourses, agents and practices. The relation in the topics in a course also show the classification of knowledge in a course (Bertram, 2012a; Hoadley, 2007, 2012; Hoadley & Galant, 2016). Bernstein (2000) used the concept of classification to examine the strength of the boundaries between the different categories/subjects. For example, the relationship (a) between teacher-student and student–student (b) between discourses- intradisciplinary relation, interdisciplinary relation and relation between academic and non-academic knowledge (c) between spaces- teacher's space – students' spaces of different students. Such relationship can be characterised by the form of the boundary. When the boundaries between the categories is blurred between students of different social groups (social class, gender, race, school achievement) then the classification is said to be weak. This means that the students share physical and material space. Strong classification will entail that boundaries between will be very sharp between space and material and that hierarchies between students will exist. However, the teacher–student relationship is always strong. However, at the intra-disciplinary level, there is a weak classification between the several contents of a given discipline and the content in the discipline are interrelated. At the interdisciplinary level, a strong classification exist since the contents of the curriculum are separated from each other, there is no relation in the contents of the discipline in the curriculum. A curriculum is said to be strongly classified if the subjects in the curriculum are highly differentiated and separated into traditional subjects. That is there is no relationship in the subjects in a curriculum. While a curriculum is said to be weakly classified if the subjects are integrated and the boundaries between the subjects are weak/fragile/blurred. That is there are relationships between the subjects in a curriculum. Bernstein also used the concept of framing to describe the control relations in the Pedagogic discourse. Framing is concerned with the control relations in a pedagogic discourse. Framing regulates the knowledge to be created and what knowledge is available in the different categories (Diehl et al., 2015). Framing enables the conversion of knowledge into the pedagogic communication. The concepts of classification and framing have been used to describe the organisation of the content in the curriculum and how the education knowledge is transmitted and acquired (Bertram, 2012; Hewlett, 2013; Mukute & Pesanayi, 2014).

Framing is said to be very strong (F++) when the transmitter (lecturer) has the control over the selection, sequencing, and time given to learning and if the teacher makes clear to students the text produced as the result of learning, while framing will be very weak (F--) when the acquirer has some control upon selection, sequence, pacing and evaluation criteria. When the framing is strong in a relationship between the transmitter and the acquirer, the transmitter (lecturer) appeals to given rules and statuses. For example, the lecturer uses orders, verbal or physical language in leading the students to behave in a given way and that the lecturer does not give reasons why the students are expected to behave that way. In a weak framing, the transmitters (lecturer) need to explain why the acquirer (students) need to behave that way and the students may criticise the practice of the lecturer.

The concept of framing is used at both macro and micro levels. At macro level, framing refers to relations within boundaries and that it is through interaction/framing that boundaries between discourses, spaces and subjects are defined, maintained and changed. At micro level, framing refers to the control over the rules of communication. Framing is concerned with the control relations between the transmitters and the acquirers. Classification and framing concepts describe the structural and interactional aspects of the pedagogic practices as it expresses the power and the control relations in a pedagogic practice (Bernstein, 1999; Bertam, 2012). In this study, the concepts of classification and framing were used as the analytical tools.

6. Methodology

To answer the research question for this study, a qualitative case study research design was used to explore the recontextualisation phenomenon by examining the data within a specific context (Tight, Symonds, & Symonds, 2016). A case study was used to allow an in-depth information on the case since I needed to provide a thick description of the phenomenon of "recontextualisation of biotechnology knowledge in the course".

The case study was centred on the Copperbelt University's Department of Mathematics and Science Education and the Department of Biological Sciences.

To be able to describe the recontextualisation of biotechnology knowledge in the plant biotechnology course, I was searching for the relations in the contexts in which the recontextualisation of biotechnology knowledge was taking place. As a researcher, I depended on the individuals involved in the design of courses.

The research site for this study was the Copperbelt University where the Department of Mathematics and Science Education and the Department of Biological sciences are of specific interest. The Copperbelt University was established through Act of Parliament No. 19 of 1987. The Copperbelt University is currently operating from four campuses which are Jambo Drive main campus, Parklands campus, Ndola campus and Kapasa Makasa campus. This study was carried out from Jambo Drive main campus.

I selected the Department of Mathematics and Science Education (DMSE) and the Department of Biological Sciences (DoBS) at the Copperbelt University for three reasons. The reasons for selecting the two departments in the School of Mathematics and Natural Sciences are that the students training to be teachers of biology in secondary schools are enrolled in the Department of Mathematics and Science Education and that the curriculum to be followed by the biology teacher education students is prepared in the Department of Mathematics and Science Education. One of the courses included in the curriculum for the biology teacher students is the plant biotechnology course which is developed and taught in the Department of Biological Sciences, hence the reason for choosing the Department of Biological Sciences as a site for this study.

The research participants in the study were purposively chosen on the basis that they had knowledge of the phenomenon to be investigated in the study (Merriam & Tisdell, 2015). The participants included the lecturers who were involved in either developing the course in the Department of Biological Sciences and teaching the plant biotechnology course in the Department of Mathematics and Science Education, the lecturers who were involved in developing the curriculum for the biology education students in the Department of Mathematics and Science Education, curriculum specialists who were involved in developing the 5090 biology syllabus at the Curriculum Development Centre.

Twelve participants were included in this study. Four of the participants were the lecturers from the Department of Mathematics and Science Education at the Copperbelt University. The head of the Department of Mathematics and Science Education and the four lecturers who were involved in teaching the fourth-year science education course at the time of data collection were involved in the study. Six of the participants were the lecturers from the Department of Biological Sciences. Participants involved in the study from the Department of Biological Sciences were the head of the department and the five lecturers who were involved in teaching the plant biotechnology course at a time of data collection.

To collect the data in this study, the interview method was used. The interview guide which was prepared by the researcher was used to collect the data. the interview guide was developed in line with the research question. The instrument preparation was guided by Mason, (2002) and Hancock (2007). Mason, (2002) and Hancock, (2007 have indicated that a research instrument should be prepared in reference to the research questions guiding the study. These approaches allow the topics and the issues to be covered in the interview to be outlined in advance on the interview guide. The research questions which guided the development of the interview guide is, ‘’How is biotechnological knowledge recontextualised in the plant biotechnology course at the Copperbelt University? Interviews were conducted in line with Mason (2002) and Hancock (2007). The two have indicated that the researcher needs to develop an interview guide on which the topics and the issues to be covered in the interview are specified. The two authors have also indicated that a researcher will decide the order in which the questions will be asked in an interview.

To understand the development of the BT 440 course, structured interviews were used to collect the data. The interviews were conducted with 10 academic staff as these were the main people involved in developing the BT 440 course. The 10 respondents came from the two departments, the Department of Mathematics and Science Education (DMSE) and the Department of Biological Sciences (DoBS). Six of the interviewees, that is interviewees 1, 2, 3, 4, 5 and 6 were from the DoBS, while four of the interviewees, that is interviewees 7, 8, 9 and 10 were from the DMSE. All the interviewees were lecturers. Two of the interviewees were heads of the department (HoDs) in the two departments, DoBS and DMSE, respectively. The indicators for the discursive rules and discursive relations were developed to guide the analysis of the transcripts were developed using Basil Bernstein’s classification and framing concepts. Atlas ti 8 software was used to analyse the data. Thematic analysis was used to analyse the data. The transcripts were analysed using the indicators developed to guide the analysis.

7. Findings of the study

A thematic analysis approach was used to analyse the interview data. The data was inductively coded using Atlas ti 8 software. Table 1 has shown the codes, categories and the theme which emerged from the analysis of the interview data.

The categories are mutually exclusive and only the codes which are related were placed in the same category. Eight categories emerged from the analysis of the codes. The categories which emerged are: biotechnology content, selection of knowledge, sequencing of knowledge, pacing of knowledge, sources of knowledge, teaching approaches, relations between categories and regulative discourse. The instructional discourse emerged as the main theme in the analysis of the interview data. Below I focus the analysis on the categories.

Table 1: Codes, categories and theme from the analysis of the Interview data

SNO	CODES	CATEGORIES	
1	• Application of biotechnology	BIOTECHNOLOGY CONTENT	INSTRUCTIONAL DISCOURSE
2	• Biotechnology it's a cumulative.		
3	• Definition of biotechnology		
4	• Knowledge of biotechnology		
5	• Need for new programmes		
6	• Skills in biotechnology		
7	• Assignments	EVALUATION CRITERIA	
8	• Examinations		
9	• Explicit assessment		
10	• Focus on tests and examination		
11	• Tests		
12	• Lecturer's work plan	PACING OF KNOWLEDGE	
13	• Time decided by lecturer		
14	• Disciplinary relations	RELATIONS BETWEEN DISCOURSES	
15	• Nature of biotechnology		
16	• Agents in course development	SELECTION OF KNOWLEDGE	
17	• Biotechnology course development		
18	• Course details		
19	• People involved in course development		
20	• Stake holders		
21	• Foundation courses needed	SEQUENCING OF KNOWLEDGE	
22	• Topic arrangements		
23	• Books	SOURCES OF KNOWLEDGE	
24	• Course outline from other universities		
25	• Experiments		
26	• Hand outs		
27	• Journals		
28	• Discussion	TEACHING APPROACHES	
29	• Field trips		
30	• Guidance!		
31	• Lecture method		
32	• Practicals		
33	• Presentations		
34	• Production of biotechnology		
35	• Projects		
36	• Question and answer		
37	• Classroom control	REGULATIVE DISCOURSE	
38	Control in behaviour		

Evaluation criteria

Evaluation is key in any pedagogic practice as it condenses the entire meaning of the pedagogic practice. The main goal of any pedagogic practice is to transmit the criteria which are not known to the learner. For the criteria to be transmitted, the criteria need to be made known to the learners. There are a number of ways in which the criteria can be explicated. Analysis of the interview data revealed that tests, labs, and the sessional examination were some of the ways in which criteria was made explicit in the developing of the plant biotechnology course.

It was evident in the data that as the course outline is developed, the assessments and the weighing of each of the assessment is indicated in the course. The course outline indicates the percentage allocated to the tests, assignments, labs and the sessional examination. Further, the findings indicated that, at least three tests and three assignments are done during the teaching and learning of the course.

Interviewees indicated that the assessments in the course were prepared in line with the assessment standards for CBU. For example, respondent 3 indicated that,

> ''The standard assessment for CBU is you have 40% continuous assessment and you have 60% which is the exam. Now under the continuous assessment, you give tests, at least 3 tests. So, test 1, test 2, test 3. So in term one you give one test, term two another test, term three another test. Then in addition to that, labs, provided there are reagents and so forth. You give labs as well; each course has got a certain number of labs which are prescribed which are supposed to be given.''

Therefore, the data indicated that CBU is explicit in the evaluation criteria to be achieved through the assessments done. The findings further indicated that, some of the lecturers explicated the criteria by guiding the learners on what was missing in the answers written by the learners. As lecturers mark the assessments, some lecturers wrote the correct answers on the answer sheets of the learners to guide them on the expected text. As respondent 1 notes that,

> ''Say you require a student to determine the gene order of certain genes. So, say, when the students is supposed to determine that, you would have given them distances between the particular genes, so when formulating that, at least, they have to have a genetic map, they come up with the genetic map. Doing that they will have to make some drawings, they will have to determine, which one is the longest distance and which one is the shortest distance. From there, they will determine which one is the gene order, yes, depending on the one which where furthest from each other. So, If the student doesn't do like that, I would at least draw a genetic map for them, then from their they would get the order.''

Respondent 1 further confirmed that in guiding the students on what was missing in their work helped the students to perform better in the examination and in the tests as the respondent indicated that,

> ''I have had the students last year for BT 410, who had trouble determining …. some parental types from a population, I don't know if you know that we have recombination that take place in the genes, from those recombinations, the phenotypes that come up are different from the parental type. So, based on the population, or the number of organisms that are produced, one is able to determine which ones are the recombinants and the parental type. So those which are many are the parental type, those which are less are the recombinants. They are either double or single recombinants. So, I did that, then I just changed a bit with the final exam question, then I found that the person actually managed. They got the question correct in the exam as in the test.''

In doing so, the lecturer was revealing the criteria to the learners. Some lecturers only made the comments on the answer scripts of the learners. Three (3) respondents out of 10 respondents, indicated that they guided the learners on what was required of them in the answers.

While some of the lecturers indicated that, due to the high numbers of the learners in the classes, they did not comment or guide the learners on the answer scripts of the learners. Instead the lecturers only underlined the serious mistakes in the answers of the learners. For example, respondent 3 indicated that he guided the students,

> ''Up to a certain level. For example, when there are 150 scripts, it will be very difficult to make comments on all scripts. But generally, we put some comments. When there is a serious mistake, we give them comments in the answer scripts in some cases. In my case I underline the wrong sentences, and tell the students to check on those underlined areas. That is to reduce the work load. So, otherwise it takes weeks to mark, complete the marking. So, we just underline and tell the students to take note of the underlined

areas. Underline means there is a mistake in that. And tell them to look for the mistakes. And then in some cases we write few comments.''

The analysis on the evaluation criteria indicate a strong framing (F+) in the evaluation criteria.
Some of the lecturers did not comment or indicate anything on the answer scripts of the learners. Instead, answers were marked only as either wrong or correct. An interview extract with responded 2 exemplifies this,

''Researcher: And when marking the assessments especially the tests, do you indicate on the papers, what is wrong with the answer? Why the student has not gotten the mark?
Respondent 2: Usually your marking key.
Researcher: Do you show on the paper of the students, that you needed to do this.
Respondent: no we don't, but if it is, we just mark its wrong. So if a student comes now to query, that's when we produce the key, and usually we give them the marking key. So they verify themselves were they went wrong''

In this case, the evaluation criteria are weakly framed (F-). This indicate that the lecturer did not explicate clearly the criteria to be acquired by the learners.

Overal analysis of the evaluation criteria has indicated that sometimes, in most cases, the lecturers clearly indicated what was missing in the answer of the learner, and in some cases, lecturers only notified that something is wrong without indicating what was missing exactly and in some cases, the lecturer did not make any indication. Therefore, on average, the findings indicate that evalaution criteria were explicated in some cases and it was not explicated in some cases. The evaluation criteria in general are strongly framed (F+) since in most cases the lecturer explicated the criteria.

Knowledge selection

Knowledge selection is concerned with the identification and extraction of the knowledge to be included in the course from the different sources. The process of selecting knowledge was a consultative process in which a number of individuals were involved. The analysis revealed that a number of experts were involved in the selection of knowledge to be included in the course. The analysis here was focused on understanding how the BT 440 was developed as this will help to understand how biotechnology was recontextualised to produce the BT 440 course. A course is developed when there is a need to teach the course. For example, in the Department of Biological Sciences (DoBS) new courses were developed when the department was developing the biology degree programmes. The plant biotechnology course (BT 440) is one of the courses developed in the biotechnology programme which was developed in the DoBS. At the CBU, developing a course is a consultative process in which a number of people are involved. Some of the people involved include the academic staff who are the lecturers, the stake holders from industries, and accreditation officers of the Higher Education Authority (HEA). The people involved in developing the course determine and influence the content of the course. Five codes were sorted into this category as shown in Table 1.

Nine respondents indicated that the selection of the knowledge into the course BT440 is a consultative process as a number of people were involved. Developing a course involves the lecturers at departmental level, at school level, members of the academic development committee and the stake holders from the industries. Nine of the ten lecturers indicated that stake holders from industries were the major sources of information. These industries include the Zam-seed and Seedco. It was evident that stake holders have helped to inform the desired knowledge, skills and values in industries. For instance, respondent 6 stated that,

''The major source of information for developing those courses was industry. They had to go out to stakeholders and ask the stakeholders whether it is the mining industry in our area, for microbiology it was the hospitals, research centres, other institutions to find out what are the needs, what has to be addressed in these courses.''

Respondents 8 also adds that,

> ''when we are talking of the stake holders, here we are talking about, the ministry of education, ministry of education, but then operating with its other wings like teaching council, Higher Education Authority, Zambia Qualifications Authority. All these at the end of the day, they need to be involved.''

At departmental level, experts in the area in which a course is being developed are tasked to develop a course outline. They make suggestions of the content to be included in the course outline. Experts consult a number of sources from which the knowledge to be included in the course is selected from. Some of the sources consulted are the course outlines developed in other universities, textbooks, journals. The course outlines from other universities are downloaded. Lecturers have to compare and benchmark with other universities. Respondent 5 indicated that,

> ''we have created different courses from the different curriculum from the different university and then we have selected the best. We have modified the syllabus and then has formed the new curriculum for the biology students.'' (Respondent 5)

In a similar view, respondents 3 adds that,

> ''the standard course which is Plant Biotechnology which is offered in South Africa, which is offered in America, which is offered in Netherlands that is the same course that we are offering here. And that course basically covers all the main areas in agriculture, in terms of how you can apply and so forth.''

The developed course outline is discussed first in the department. Once the department has finished, the course is then discussed at school level where all the members in the school have to be present in the Board of Studies. In this discussion, the members are free to suggest changes to the course content and the assessments. The school board either approves or disapproves the course. When the course has been approved, it is taken to the Academic Development Committee of the University Senate. At this level the members of the Senate also check the details of the course. Senate members also check if the course is in line with the university regulations. When the course has been approved at this level, it is then taken to the Higher Education Authority (HEA) for evaluation for the purpose of accreditation. The HEA will also check if the course meets the expected standards of which some of them include the qualifications of the lecturers to teach the course and the hours accredited to teach the course. If the course meets the expected standards, it will then be approved by the HEA. Only the course has been approved by the HEA that it will be taught in the university.

Course development procedures were evident in the 9 respondents. One respondent indicated that was not sure of how the courses were developed in the university. This could be because the lecturer was new in the teaching and had just joined the University. The 9 respondents had the similar views of how courses were developed. For example respondent 9 stated that,

> ''The way the courses are developed, you sit at departmental level and you agree which courses to include in the curriculum and the content of those courses and why those courses you are including them in your curriculum. Then after that at departmental level you take it to the school level, and if it is agreeable at school level then a letter is written. Some kind of recommending that these courses we need them in the department. That is now the Dean in collaboration with the HOD of the department, they write a letter to management and academic, there's an academic committee there and those are the people who will either agree to say yes go ahead with this course or not and they'll write back. ''

In this case, in terms of selecting the knowledge to include in a course, the lecturers and the stake holders decided the content to be included in the course. The learners are not involved in the selection of the content to be included in the course. Therefore, the selection of knowledge is strongly framed (F+).

Sequencing of knowledge

Sequencing is concerned with ordering of the content to be done in the course. In this study sequencing was analysed in terms of control in ordering the topics in the BT 440 course. Respondents indicated that, the topics in the BT 440 course are not presented in the order in which they are to be taught. Therefore, the lecturer teaching the course has to arrange the topics in the order in which the topics are to be taught. When a course outline has

been given to the lecturers, the lecturers decide the order in which the topics are to be taught. Lecturers develop a teaching plan which is to be followed in teaching the course topics.

Topics are taught in a relation to each other. That is a hierarchical arrangement of the topics. Topics are hieratically arranged as one needs to understand the basics of the topic before getting to the next topic (Respondents, 1 and 2). For the topics to be arranged in a relationship to each other, the person arranging the topics should have a good understanding of the knowledge, skills and values taught.

> '' We have basics first. One needs to acquire some knowledge. Biotechnology is more practical than theoretical. Though if you just get to say DNA extraction or probably insertion of the new gene in a particular DNA. Somebody must have acquired some knowledge about the DNA. Where it is found, what is the person supposed to do to get the DNA. Yes! First it should be some introduction. Somebody need to acquire the basics first.'' (Respondent 1)

Nine out of the ten respondents indicated a similar view as they indicated that, the lecturers teaching the course were the ones to arrange the topics in the order in which they will be taught. When a course is designed, it has the topics to be done, the assessments, the practicals, the aims of the course and the objectives to be achieved in the course. For instance,

Respondent 1 indicated that,

> ''We have basics first. One needs to acquire some knowledge. Biotechnology is more practical than theoretical. Though if you just get to say DNA extraction or probably insertion of the new gene in a particular DNA. Somebody must have acquired some knowledge about the DNA. Where it is found, what is the person supposed to do to get the DNA. Yes! First it should be some introduction. Somebody need to acquire the basics first.''

Arranging the topics in relation to each other makes the knowledge more relevant in the different context. Knowledge will not be context specific or context dependence, instead the knowledge will be used to understand other topics. In this case, the learners are also helped to understand abstract concepts. Respondent 3 indicated that,

> ''We just have the course outline with the topics, the main topics that are in the syllabus, and then you as a lecturer now you have to divide because every term is 10 weeks, yah every term is 10weeks. So you have to divide those lectures within the 10 weeks. Because every term has 10 weeks and also we reserve one week at least for tests.'' (Respondent 3)

Similar views were said by the 9 respondents as they confirmed that, once the course outline is prepared, a copy is given to all the lecturers who are going to be teaching the course. When the course lecturers have received a copy of the course outline, the lecturer will write a teaching plan on how and the topics will be taught. The lecturers also decide on the activities to be done in class.

Besides arranging the topics in order, lecturers also decided how the topics were to be presented to the learners and the activities to be done in the teaching and learning of the BT 440 content.

Teaching approaches

The teaching approaches are the means through which the criteria are taught to the learners. Though a number of the methods were used by the lecturers, the analysis of the data revealed that, the most common teaching approaches used in teaching the BT 440 are the lecture method, discussion and the question and answer method. The respondents indicated that, when the course outline is given to the lecturers, the lecturers decided how they are to teach the course. In most cases lecturer used the lecture method in the teaching of the course. The lecturers indicated that they used the lecture method and the question and answer method, because their main objective is to finish teaching all the topics in the course outline. This could be achieved if the lecture method and the question and answer method were used in the teaching.

The 10 respondents indicated that they use lecture method because the main focus was to finish teaching all the topics in the course outline. Lecture method is a method in which the lecturer is in control of the activities in the classroom. In a lecture method the lecturer has the authority. The practice in this class is that the lecturer talks

while the learners are listening. Respondent 2 said that, ''the focus here is mainly on, what, completing your syllabus, so given the time that we have, and the topics that we have to teach, very difficult to have interactions.'' The lecture method allows the lecturer to cover more work in the 2hours teaching time. Though the focus was to finish the syllabus, lecturers also indicated that they also used discussions and presentations in teaching.

Respondent 4 notes that,

> ''I use.., lots of, not completely lecture method. I use a mix of lecture and interact with the students during the classes. So its not completely lecture method. A type of discussion also goes on in the class. That's my way of teaching. Not completely lecture methods.''

Though lecture method is mostly used in teaching, it is not the only method used. Other methods such as discussion, question and answer are also used in teaching. Though a number of the teaching approaches were used in teaching Biotechnology, the most used method is the lecture method.

The lecturers who are knowledgeable in the course decide how the topics will be taught and how the assessments will be done in the course. The lecturers also decide on the activities to be done during the teaching of the BT 440 knowledge. In this case, the selection of knowledge is strongly framed and sequencing of the knowledge are strongly framed (F+).

Pacing of knowledge category

Pacing was analysed in terms of who decided on the time needed for the learners to acquire the criteria. The analysis of the data indicated that, as the course is developed, time to be taken to teach a topic is not indicated in a course outline. All the 10 respondents indicated that how long one should take to teach a course is decided by the course designers as they develop a course or a curriculum.

Respondent 3 also notes that,

> ''students usually get confused if you put too much information at once. So, you just cover, depending, there are certain topics which are long so you can divide them, there are certain topics they are short, so it depends upto the lecturer, to say, I think this topic is very long so you divide it into sections, sub-sections. Then you teach according to the sub-sections until you finish that topic. But there are others which a topic is short which you can finish within one lecture.''

The lecturers decide how long one should take to teach a topic. Some topics need more time while some topics need less time. The findings have shown that pacing of the knowledge to be transmitted and acquired in the 2hours (actually 4 hours/week) lecture is done by the lecturer. The course outline only indicates the lectures to be done per week. The plant biotechnology course outline does not indicate how many lectures are to be done.

Therefore, in terms of pacing, framing is strong (F+). The lecturer decided on the time to take to teach the course and on the activities to be done during the teaching and learning. There was no indication in the data that learners-controlled pacing of the teaching and learning. Learners have little control in the learning time to be taken.

Relations between discourses

The relations between categories determine the strength of insulation between the discourses. Bernstein used the classification concept to analyse the relations between categories. The analysis of the discourses has shown that, in bio-technology there is a strong relationship between the disciplines was evident in the responses below. Respondent 1 indicated that biotechnology,

> "actually, incorporates most of the courses. For instance, Bioinformatics, learners have to know how to work with the computer. They have to come up with some software that would manipulate DNA. Yes. I think it does incorporate other courses"

Respondent 2 also notes that,

> ''biotechnology is a combination, of microbiology, combination of genetics, combination of chemistry, even combination of engineering principle, principles. So, chemistry, microbiology hmmmmm, engineering and a bit of even physics, because now there is optics in biotechnology.''

There is a strong relationship between the disciplines in terms of inter-disciplines. In this case classification is weak in the inter-disciplinary relation.

The analysis also revealed that there is a relationship between biotechnology knowledge and the everyday knowledge which Bernstein has called inter-discursive relation. For instance, respondent 2 notes that,

> ''Biotechnology now is a field for anybody. Because now in industry, so we have chemical engineers, we have just physical or civil engineers in it, we have mathematicians in it, we have chemistry in it, physists in biotech. So, in countries where people know how to join forces. These people with different what, disciplines come together. You get it. But for them to understand, each one of them must have at least a foundational understanding of the co-principles of biotechnology.''

Respondent 3 adds that, '' Biotechnology is a cross cutting field.''

This indicates a strong relationship between the academic knowledge and the non-academic knowledge (Inter-discursive relation). Therefore, classification is weak (C-) in terms of the inter-discursive relation.

Respondents further indicated that,

> We have basics first. One needs to acquire some knowledge. Biotechnology is more practical than theoretical. Though if you just get to say DNA extraction or probably insertion of the new gene in a particular DNA. Somebody must have acquired some knowledge about the DNA. Where it is found, what is the person supposed to do to get the DNA. Yes! First it should be some introduction. Somebody need to acquire the basics first. '' (Respondent 1)

Respondent 1 further indicated that, ''Biotechnology it's a cumulative.''

Therefore, there is a relationship between the topics taught in biotechnology. This was also evident in the sequencing category. Therefore, classification is weak (C-) in terms of intra-disciplinary relationship.

Regulative discourse

The regulative discourses are concerned with the hierarchical rules of the pedagogical discourse. The analysis also revealed that lecturers were also concerned with the way learners behaved in class. Respondents indicated that,

> ''as a lecturer, before you start, you demand attention from students. There are times when you come like me I use beamer, I am connecting this and that I found students talking to each other, then you are hearing to ma noise, here and there, you know, people they are talking. So, before you start you just say, attention everybody or you just greet them greet them good morning! So, you find once they answer good morning. And all of the sudden all of them pay attention to you because they want to listen. As you continue if you observe that some students are not paying attention they are doing something or someone is sleeping, sometimes I just call that student, hello there! What do you think about this? I ask that student who was sleeping. And then all of the sudden you just see them pay attention. Ooh so he has seen me. But if there are people talking you just stop in front and then you ask the people that are talking, what are you talking about? Can you tell everybody, we want you now to speak loud so that everybody can hear? So that is basically what is done.'' (Respondent 3)

Respondent 1 adds that,

> ''If the students have missed the assessment test, we will get the advice from our head of department and then the dean of schools. According to their suggestions and the university guide, we will follow the next level. That means we will conduct a re-test if it is reasonable. They have to produce a valid reasonable reason or medical reason of what purpose they have not attended the continuous assessment test or any other test. What is the reason? Why they have not attended the particular test? Then they will have to give the return statement if at all it is valid. Then we can proceed for the next step. The next step means we can be able to conduct the re-test and then go for the remarking. Once we are done with the marking of the particular students, and then, we will enter the results on the portals.''

Respondent 3 adds that, ''If the reasons are not there, it's a zero.''

Hence in terms of the regulative discourse, the lecturer was in control this indicate a strong (F+) framing.

Instructional discourse

The instructional discourse emerged as the main theme in the analysis. As earlier indicated, the instructional discourse is concerned with the discursive rules (selection, sequencing, pacing and evaluation criteria) and the

relations between the discourses (inter-discipline, intra-discipline, inter-discursive) of the pedagogic discourse. This therefore indicates that, the developing of the BT 440 course is more focused on the instructional discourse. In summary, the analysis of the interview data has revealed that the control relations (framing) between the agents in terms of hierarchical rules, knowledge selection, sequencing, pacing and the evaluation criteria were all strongly framed (F+). In terms of the relations between discourses, the classification was weak (C-) in the inter-disciplinary, intra-disciplinary and in the inter-discursive relations.

8. Discussion

The findings on the analysis of the data indicated that, the development of the BT 440 course is a very consultative process which is characterised with strong framing (F+) in the hierarchical, selection, sequencing, pacing, and evaluation criteria of the knowledge. A strong framing in the selection of knowledge imply that the knowledge which was included in the BT440 course was selected by the lecturers. The students did not contribute in any way on the content knowledge included in the course. The knowledge was selected from a number of different sources. Bernstein calls the sites from which knowledge was extracted as the production field in which the disciplinary discourse is produced by the experts. In chapter 3, the literature has shown that the knowledge produced in the production field is strongly classified and that Bernstein calls this knowledge as the singulars. Recontextualisation is a process done by the officers in the recontextualisation field. Once the knowledge has been produced, the agents in the recontextualisation field start selecting the knowledge and organising it in the manner in which it will be taught.

In education, recontextualisation leads to the production of a pedagogic discourse. In this case the recontextualisation work was done mainly by the lecturers. The learners only come to see the course outline in class that is in the reproduction field of the pedagogic device. Since the lecturers are the ones involved in the sequencing of the topics, the lecturers also decided on acquisition time in the learning of the topic. Therefore, the lecturers who are knowledgeable on what was to be taught were involved in the pedagogic discourse that is in the development of the course or the curriculum. In the case of biotechnology, Bernstein describe it as the formation of a 'region' in which the knowledge is weakly classified (Ensor, 2004; Reeves, 2006; Firth, 2011).

During the developing process of the BT 440 course, the lecturers also had to organise the topics in relation to each other that is sequencing of the knowledge. Bernstein call this arrangement as a hierarchical organisation of the knowledge. It therefore makes sense that the lecturers who are knowledgeable with the content included in the course are the ones involved in the sequencing of the topics in the course. In the development of a course, the lecturer also decided on the acquisition time in the learning of the topic, that is the time learners are expected to learn the content of the course. A strong framing in the evaluation criteria meant that the lecturer indicated explicitly what the learners are expected to learn in the BT 440 course. These findings were similar to a number of studies carried by other scholars (Deng, 2009).

A number of studies (Ensor, 2015; Larsen, 2013; Bertram, 2008; Hoadley, 2005b; Morais et al., 1992; Morais et al., 2005) have indicated that, for a successful learning of all the learners in class, a weak framing in the pacing and hierarchical rules are necessary conditions. The weak framing in the pacing and in the hierarchical rules should be accompanied by a strong framing in the selection, sequencing and evaluation criteria of the knowledge. Studied have also indicated that, a school code has a middle-class assumption, hence it gives learners from a middle class background to easily acquire the school code as compared to the children with from the poor and marginalised background. It is therefore urgent that a middles class assumption indicated in the school code be interrupted with the use of mixed pedagogic practices in class which is characterised with both weak and strong framing in the hierarchical rules, selection, sequencing, pacing and the evaluation criteria. It is important that the lecturers teaching the course are aware of the characteristics of the pedagogic discourse to be implemented in class.

9. Conclusion

From the analysis done, it is evident that, framing was strong (F+) in the hierarchical rules, knowledge selection, sequencing, pacing and the evaluation criteria were all strongly framed (F+). The findings indicate that the control

was on the academic staff. While the relations between discourses, the classification was weak (C-) in the inter-disciplinary, intra-disciplinary and in the inter-discursive relations, indicating a relationship in knowledge.

Acknowledgments

I would like to acknowledge the ministry of Higher Education in Zambia for funding this study, Copperbelt University for allowing me to collect the data and Mukuba University for their financial support and time which enabled me carry out the study.

References

Bertram, C. A. (2008a). *Curriculum recontextualisation : a case study of the South African high school History curriculum*.

Bertram, C. A. (2008b). Curriculum recontextualisation: a case study of the South African high school History curriculum. *Faculty of Education*, *PhD Thesis*, 414 pages. Retrieved from sed.ukzn.ac.za/Libraries/Carol_Bertram/CarolBertramPhD.sflb.ashx

Bibila, S. (2016). *Qualifications, knowledge and curriculum divisions: an analysis of the Welsh Baccalaureate Advanced Diploma*. Cardiff University. Retrieved from http://orca.cf.ac.uk/id/eprint/101016

Diehl, M., Lindgren, J., & Leffler, E. (2015). The Impact of Classification and Framing in Entrepreneurial Education : Field Observations in Two Lower Secondary Schools. *Universal Journal of Education Research*, *3*(8), 489–501. https://doi.org/10.13189/ujer.2015.030803

Ensor, P. (2004). Modalities of teacher education discourse and the education of effective practitioners. *Pedagogy, Culture and Society*, *12*(2), 217–232. https://doi.org/10.1080/14681360400200197

Hoadley, U. (2005). Analysing pedagogy: the problem of framing. In *Consortium for Research on Schooling, April 2006*.

Hoadley, U. (2006). The reproduction of social class differences through pedagogy: A model for the investigation of pedagogic variation. In *Consortium for Research on Schooling, April 2006* (pp. 1–31).

Luckett, K. (2009). The relationship between knowledge structure and curriculum : a case study in sociology, *34*(4), 441–453. https://doi.org/10.1080/03075070902772018

Millar, R. (2014). Designing a Science Curriculum Fit for Purpose. *School Science Review*, *95*(352), 15–20.

Morais, A., Fontinhas, F., & Neves, I. (1992). Recognition and Realisation Rules in Acquiring School Science???the contribution of pedagogy and social background of students. *British Journal of Sociology of Education*, *13*(2), 247–270. https://doi.org/10.1080/0142569920130206

Morais, A. M., Neves, I. P., & Afonso, M. (2005). Teacher training processes and teachers' competence - A sociological study in the primary school. *Teaching and Teacher Education*, *21*(4), 415–437. https://doi.org/10.1016/j.tate.2005.01.010

Player-Koro, C. (2011). Marginalising students' understanding of mathematics through performative priorities: A Bernsteinian perspective. *Ethnography and Education*, *6*(3), 325–340. https://doi.org/10.1080/17457823.2011.610583

Reeves, C. A. (2006). *THE EFFECT OF "OPPORTUNITY-TO-LEARN" AND CLASSROOM PEDAGOGY ON MATHEMATICS ACHIEVEMENT IN SCHOOLS SERVING LOW SOCIO-ECONOMIC STATUS COMMUNITIES IN THE CAPE PENINSULA. Measurement of Impact Breakage Properties of Ore Particles Using a Series of Devices*. University of Cape Town.

Singh, P. (2002). Pedagogising Knowledge : Bernstein ' s Theory of the Pedagogic Device. *British Journal of Sociology of Education*, *23*(4), 572–582. https://doi.org/10.1080/0142569022000038422

Singh, P., Thomas, S., & Harris, J. (2013). Recontextualising policy discourses: A Bernsteinian perspective on policy interpretation, translation, enactment. *Journal of Education Policy*, *28*(4), 465–480. https://doi.org/10.1080/02680939.2013.770554

Wheelahan, L. (2005). The pedagogic device : the relevance of Bernstein ' s analysis for VET. *Vocational Learning: Transitions, Interrelationships, Partnerships and Sustainable Futures : Proceedings of the 13th Annual International Conference on Post-Compulsory Education and Training, Gold Coast, Queensland, 5-7 December, 2005*, (May), 1–8.

Wheeler, J. (2009). Knowledge Transfer. *Canadian Journal of Dental Hygiene*, *43*(3), 122. https://doi.org/10.4018/978-1-59904-931-1.ch094

Young, M. (2007). What are schools for ?