Using Indigenous Language Resources for Promoting Science Learning.

Innovative education through indigenization

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Language and science

Henderson and Wellington (1998) contend that "for many pupils, the greatest barrier to learning science is the language barrier." (p. 35).

Some proposed explanations for this phenomenon are:

- **The complexity of scientific language** used in school- Fang (2004)
- **Differences between the cultures** of home and school and among languages used in students' home, at school and in school science (Yore & Treagust, 2006) which may result in
  - Language-identity dilemmas (Brown, 2011)
  - Cultural conflicts between home and school science (Costa , 1994; Jegede & Aikenhead, 1999; George 1986; Glasgow 1986)
- **Lack of appropriate pedagogical practices by science teachers** to promote language awareness , language development and cultural border crossing in the science content area. (Brown , 2011)

Cultural Border Crossing

Language is an integral component of culture.

- In order to learn science, students must navigate through their own language, the language of instruction (which may be different from their own) as well as the language of science.
- This involves “cultural border crossing”(Aikenhead & Jegede,1999)
- Teachers can act as ‘culture brokers’ (Aikenhead ,2001)

The beginning of this process is the development of an in depth appreciation the language the students bring to the science.

A description of the study

This qualitative case study involved the development and use of ***culturally responsive pedagogy*** (Gay, 2002) It aimed to:

- Generate a deeper understanding of students' indigenous language by uncovering some of the cultural meanings ascribed to words used by students in a rural science class.

- explore how indigenous language resources could be used to promote science learning and help students to bridge the gap with discourse in school science.

Research Questions

1. What are the cultural meanings ascribed to some common words and expressions used both in science class and in students' everyday lives?

2. In what ways (if any) does students' appropriation of scientific discourse change when science lessons are designed to create opportunities for students to use both their everyday language and scientific discourse?

Data Collection

This project was carried out in two phases.

- **Phase one:** collecting data regarding words and expressions used by students in the science class which had different cultural meanings to the meaning ascribed to them in conventional science.
  - Audio taping of classroom discussions
  - Taking note of words and expressions used by students
  - Follow up interviews with selected students/ groups of students for clarification
- **Phase two:** designing and teaching lessons which would facilitate cultural border crossing and the appropriation of scientific discourse.

Data analysis

- Grounded Theory Analysis
  - Transcriptions of interviews and classroom discussions
  - Coding
  - Identification of themes

Findings

Research question 1: What are the cultural meanings ascribed to some common words and expressions used both in science class and in students' everyday lives?

- Two categories of words or expressions emerged:
  - **Words and expressions that were uniquely cultural / indigenous**
  - **Words and expressions also used science or in Standard English with cultural meanings that may be similar, related or different**

Uniquely cultural / indigenous words and expression

A - Miss yuh know why? Yuh see like when yuh drink rum yuh does get ah head? Well when yuh smoke weed and thing is de same head yuh getting

M- you mad ah what boy! Dat is not de same thing. Dat is a different head.

A- yes when yuh smoke weed yuh does get ah head to calm yuhself

D- (interrupting)- calm yuhself? Man does want to kill deyself!

A- Well anyhow miss rum does give yuh de same head.

M- he mad ah what?

D- so when people drink rum and dey go in dey car and speeding down de road… dat is calm?

A- well wait nah dog… No… rum does aggravate yuh… it does cause yuh to fight. Dey say weed does calm yuh down.

Word / expression	Use in context	Explanatory note
Get ah head	- Yuh see like when yuh drink rum yuh does get ah head -Well it have good head and bad head	To be under the influence of a drug.
Barkin a tree	When yuh bark de tree it does dead. Yuh does have to cut de skin right around and it does dry up	Girdling - cutting a groove or notch into the trunk of a tree to interrupt the flow of sap between the roots and crown of the tree
Drawin tea	Dey say that weed good fuh yuh, but not when yuh smoke it. Yuh does have to draw it to make ah kind ah tea.	Steeping – soaking in water (or other solvent) to extract components
Twenty piece/ ten piece/ five piece	Yea miss- yuh see how ah twenty piece across here small so …across dey… fuh de same twenty yuh getting a whole handful ah weed	A measure of marijuana sold for twenty, ten or five dollars.
Weed block	Leh we say D have ah weed block and J have ah weed block. People buyin from both ah dem right…	A place where marijuana is sold
Tabanca/ tabanktruck	Like when yuh girlfriend lef yuh and yuh have a serious tabanktruck Yeah ah tabanktruck is ah real bad tabanca	In a love sick state. Describes how someone feels after being cheated on by their loved one. Can also describe unrequited love.
Short breath	-Nah miss I cyah do dat I have short breath.- -When yuh suck cocoa yuh does get short breath- -Dey say weed tea good fuh short breath.- -when yuh have short breath yuh heart does pain yuh and yuh does cyah ketch yuh breath -I have asthma so I does get short breath	Shortness of breath, breathlessness * several students in the class claimed to “have short breath” – for them it seemed to be an inherent condition/ a disability Other students said they “get short breath” – they it seemed to regard it as more temporary – a symptom rather than a condition

Word / expression	Use in context	Explanatory note – cultural meaning
Chemical	Well miss… weed right…it natural… but cigarette…dey does add chemicals in it", "miss dey does make cigarette in a factory and dey does put in all kinda chemicals in it mix up with de leaf …like rat poison and thing	A dangerous substance or An artificial substance
Hard	1.He does drive real hard 2.Cigarette come like de same ting like weed … same smoke...just one hittin harder -When yuh smoke ah hard weed 3.Miss sometimes science real hard	1.hard = fast 2.hard = effective/ good/ potent 3. hard = difficult
Ventilation	De snake pass through de ventilation	Means through which air passes into a building- e.g. blocks or wire mesh. The students use the word ventilation to mean the actual block/ wire.
Matter	Dat doh matter to me	It is not important
State	Miss like when yuh mudder tell yuh dat yuh room in ah state	state = disorderly
Composition	Miss, when yuh say composition, yuh mean like ah essay ? Like what we does write for SEA	Composition = essay

Findings

Research Question 2: In what ways (if any) does students' appropriation of scientific discourse change when science lessons are designed to create opportunities for students to use both their everyday language and scientific discourse?

- Three lessons were designed to draw on the cultural/ linguistic resources of the students and to facilitate cultural border crossing.
  - Gettin' "ah head" could prevent you from getting ahead.
  - WHO say dat?
  - Chemicals and You

- The design of the lessons was informed by literature on cultural border crossing summarized below:

Strategies for Cultural Border Crossing

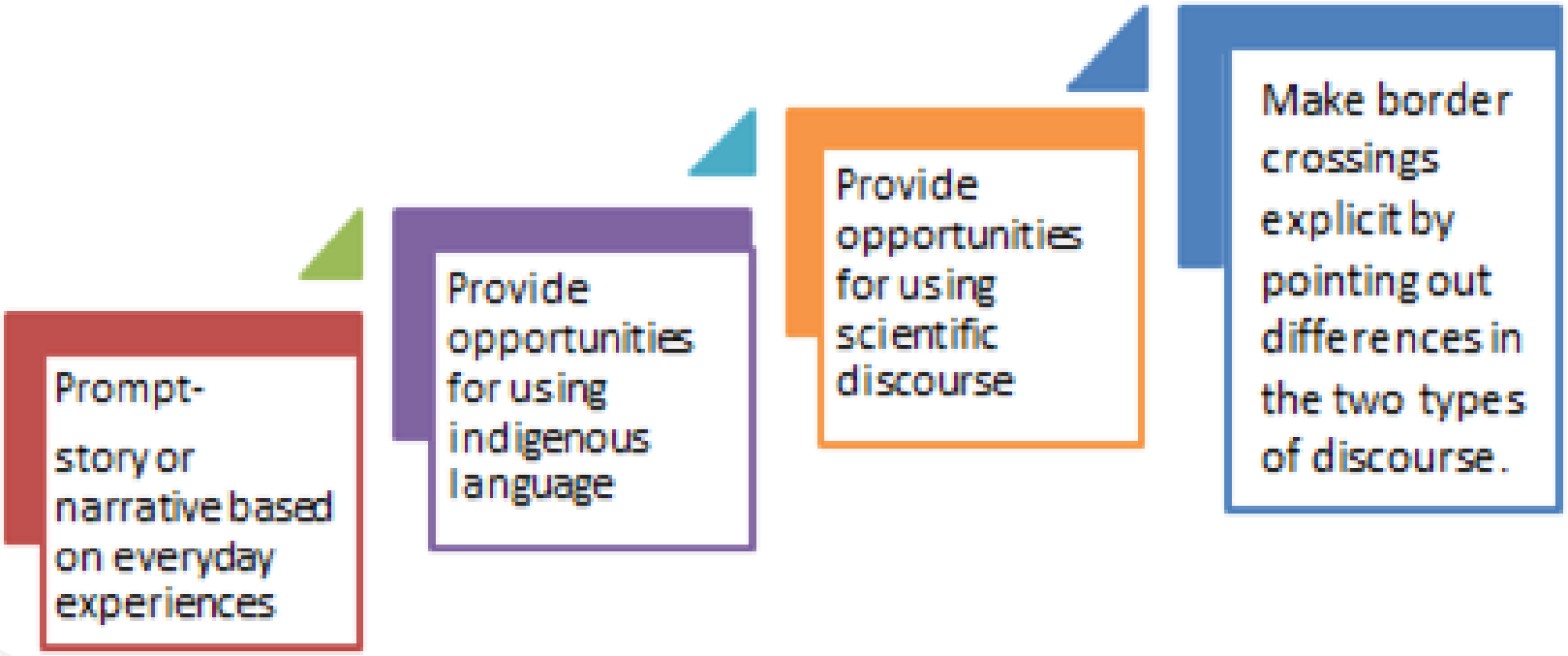
Aikenhead (2001) He suggests that teachers should:

- **Play the role of culture broker** making border crossing explicit by:
  - **Identifying the context in which students' personal ideas are contextualized** and then introducing a different view point(that of western science for our purposes)
  - **Providing opportunities for engagement in both cultures** and ensuring that students are consciously aware of which culture they are participating in at a given point.

- **Encourage flexibility, playfulness and feelings of ease** (Lugones,1987) by establishing a social environment within the classroom that encourages discourse, and avoids sanctions for being "unscientific" .

- **Substantiate and build on the validity of students' personally constructed ways of knowing**

- **Deal with conflict openly and respectfully.**



The model used for designing lessons using indigenous language for cultural border crossing in science class

Findings

- There was some indication that students had made progress toward the appropriation of scientific discourse.

  - Example 1:

    Prior to the lesson on chemicals students' comments about chemicals indicated that they understood a chemical to be something unnatural and dangerous

    After the lesson students' seemed to have a better understanding of the term:

    - " Chemicals can be dangerous or sometimes useful",

    - "you can find chemicals anywhere … like food is a chemical and water and things we does use in de house"

Findings

D- Well I find dat is real stupidness eh… for Ministry of Health to say dat smoking dangerous to yuh health but dey still lettin dem sell it!

A- well dey cant just close down de (cigarette) company, but dey could make dem write dat on de pack.

D- How yuh mean… I find dey should close dem down

P- boy remember is people wuk

J- well just shut dem down and open up a weed factory. Dat go make money too!

Teacher – (laughs) well dat is ah creative solution but ah don't think that will help de situation with cancer…

L- but miss how come people who never smoke dyin from cancer and people who smokin not getting cancer

J- yeah! Dat is true. My grandfather smokin for real years and nothing eh wrong with him. He real strong. Dat man big and strong … if yuh see him. He is about sixty someting years and he workin garden like dat… no cancer … nuttin.

K- hear dis nah miss- dey say dat about 1000 people in de Caribbean quit smoking each year (reading).

A- (interrupting) Whey?! Who say dat?... and two thousand start to smoke (class laughs)

K- oh gorsh boy !Well listen nah! Dey say 1000 people does stop smoking because dey die from lung cancer!

L- oh ho! Yuh hear what she say? She say 1000 people does dead from smokin every year.

Findings

Students were able to interact with information in more scientific ways and to point out differences between scientific argument and everyday argument.

- Example 2 - At the beginning of the lesson “WHO say dat” the following responses were given by students to explain how scientists got information relating smoking to cancer:
  - “if somebody smoking and later on in life dey find out dat dey have cancer”,
  - “Dey do tests”

- Later responses showed that students had addressed several factors that were absent in their earlier responses such as :

  - comparison of smokers and non-smokers
  - the need for a large numbers of participants in the research
  - the ethical considerations (such as age of the participants)and
  - the need to consider how long the participants had been smoking.

Discussion and Implications

This study adds to a wealth of research that points to the need for validating and utilizing students' indigenous knowledge and language to promote learning, and the effectiveness of doing so.

(Aikenhead,1996; Bajracharya &Brouwer,1997;Brown, 2011; Brown &Spang, 2007; Emdin, 2010)

Challenges

- Requires some adjustments on the part of the teacher as it may take them out of their "comfort zone"
  - new tools and strategies for classroom management
  - willingness to share the stage
  - a view of science as "one way of knowing"
  - respect for indigenous knowledge and language
  - creativity in lesson planning to incorporate indigenous language resources

Discussion and Implications

- Opportunities for:
  - Increased student engagement and motivation
  - Improved appropriation of scientific discourse- making science more accessible
  - Addressing higher level objectives
  - Validating cultural identity and engendering national pride.


Thank You