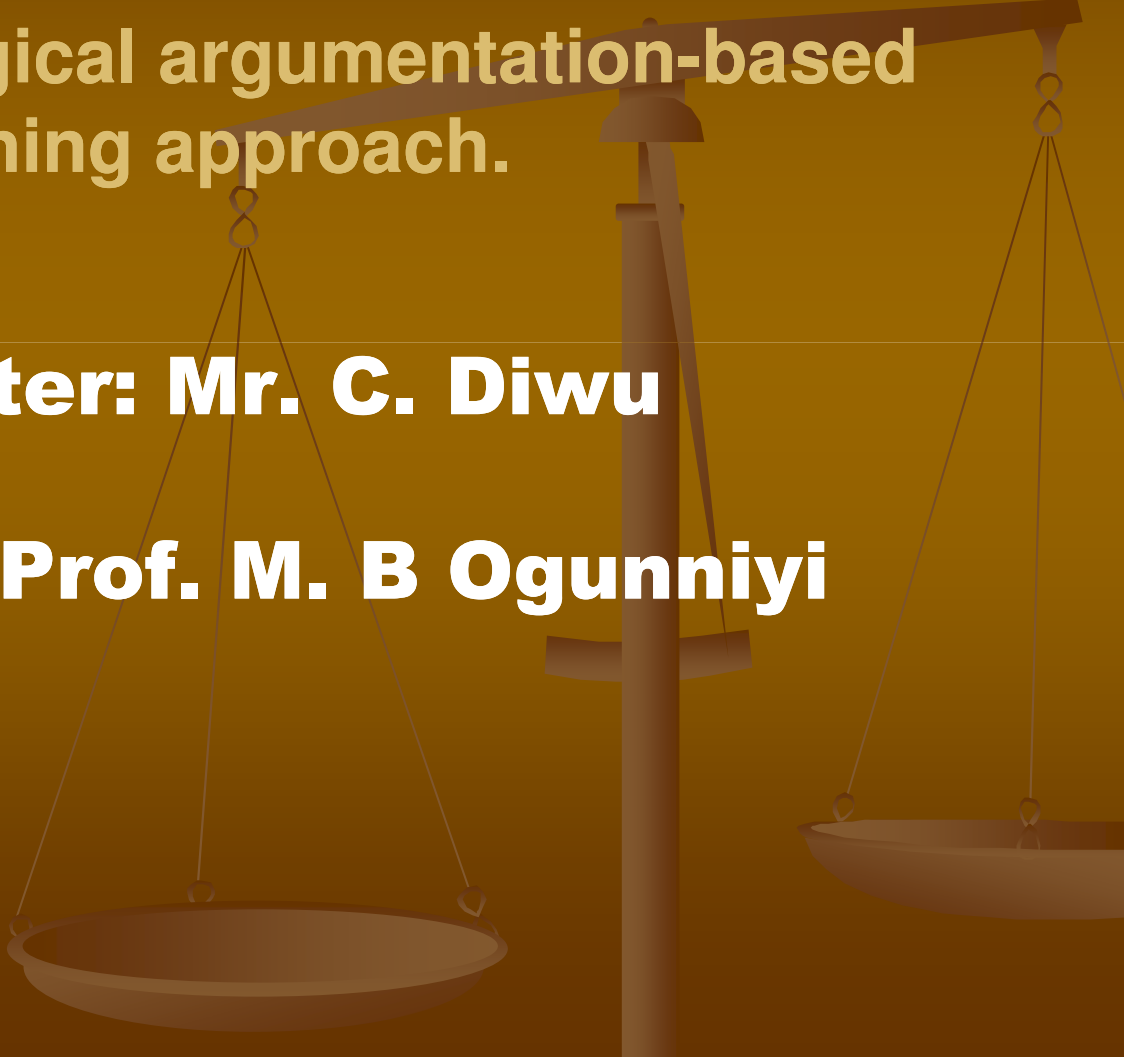


**Realising a science and Indigenous
knowledge systems curriculum: A case
study of a dialogical argumentation-based
teaching approach.**

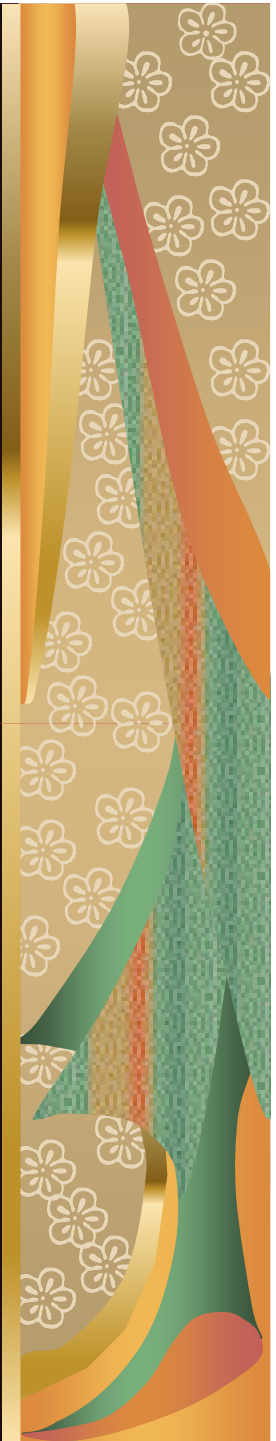


Presenter: Mr. C. Diwu

Co-author: Prof. M. B Ogunniyi

BACKGROUND

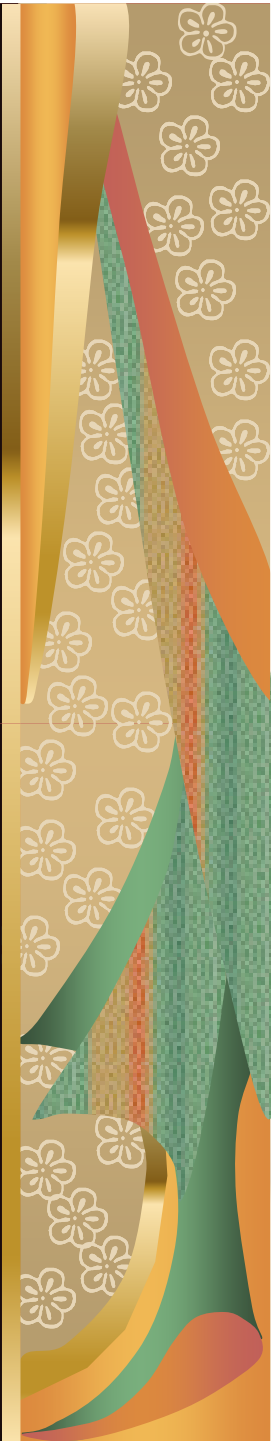
- ❑ L.O 3/S.A 3 of the New Curriculum/CAPS document calls for the integration of IKS with school science.
- ❑ Integration has been justified on the account to discover IKS knowledge that is deemed to have been lost over the past 300/350 years of colonisation and that within such knowledge lies knowledge which, even western science has not yet learned to recognise.
- ❑ However, what the designers of the New Curriculum seem to be ignoring is the fact that the two thought systems are incompatible with respect to their epistemology, ontology and axiological assumptions.



BACKGROUND

Because:

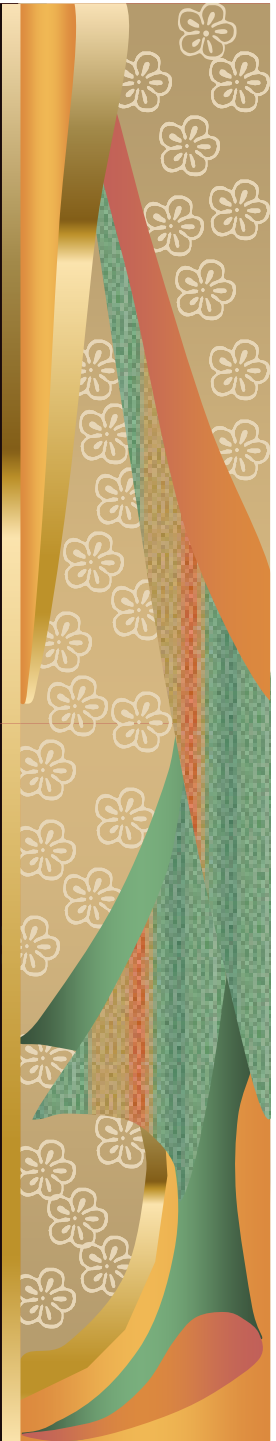
- ❑ Teachers were not trained in science/IKS mitigation & adaptation strategies and moreover, no science/IKS integrated materials accompanied the call for integration.
- ❑ School science syllabus and even examinations do not reflect a serious need for the integration of the IKS into the existing syllabus.



THEORETICAL UNDERSTANDING

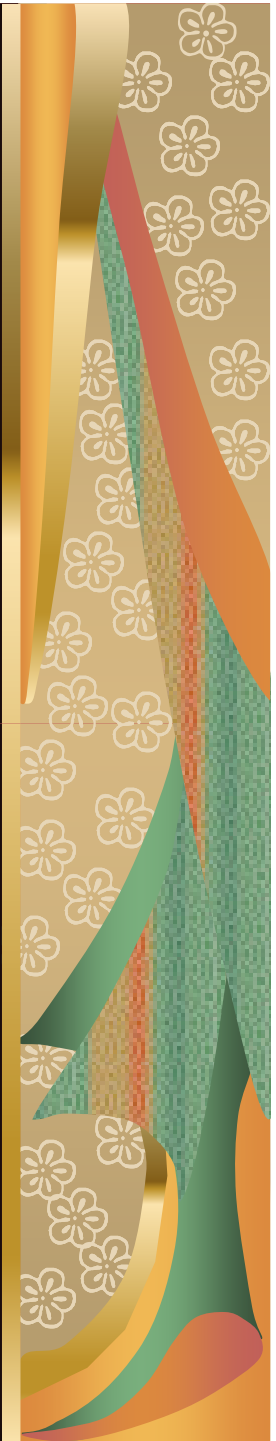
School science is a human construct, particularly of the western worldview (excluding IKS) and hence:

- The need for a holistic unbiased epistemological approach that can intellectualise both school science and IKS worldviews.
- The need for unrestrictive and unassimilative instructional materials that enhances free thinking and are consonant with learners' contextual knowledge.
- Dialogical argumentation teaching approach incorporating both Toulmin's deductive/inductive as well as the Contiguity Argumentation theory which caters for both deductive/inductive and illogical argumentation frameworks.



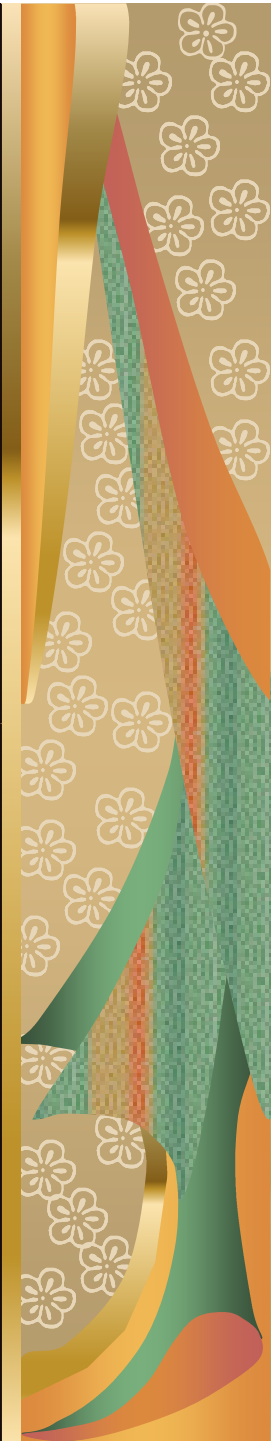
PURPOSE

This study sought to **explore** the **possibilities** and **challenges** associated with the enactment of an IKS integrated science **curriculum implementation** and how a dialogical argumentation instructional teaching approach could **mitigate** or **aggravate** such integration.



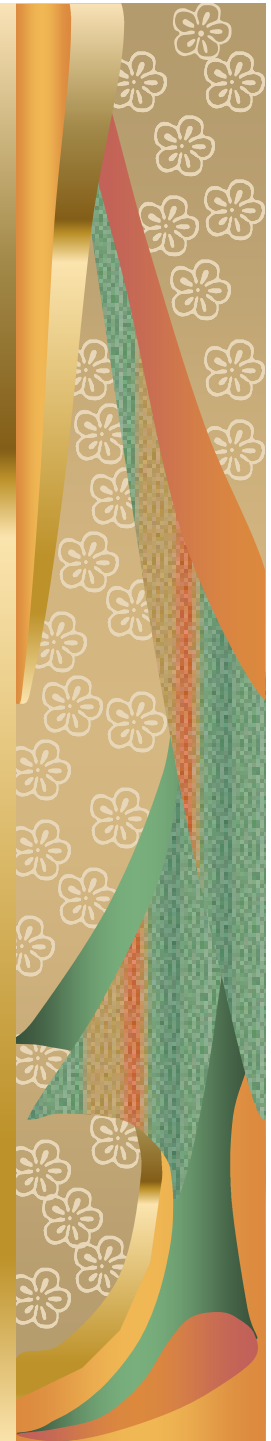
RESEARCH QUESTIONS

- What are **learners' views** and **attitudes** towards the integration of science and IKS?
- How and in which way (if at all) does a dialogical argumentation-based approach help to **mitigate** or **aggravate** the teacher-learner interaction in resolving cognitive conflict as a result of the integration of two non-compatible thought systems?



RESEARCH METHODOLOGY

- A grade 10 science classroom.
- A case study & qualitative research design.
- Bilingual science-IKS lessons presented to learners over a period of six weeks.
- Unit of analysis were classroom observations, learner worksheets and focus group interviews.
- Data analysed in terms of TAP and CAT as well as the extant literature.



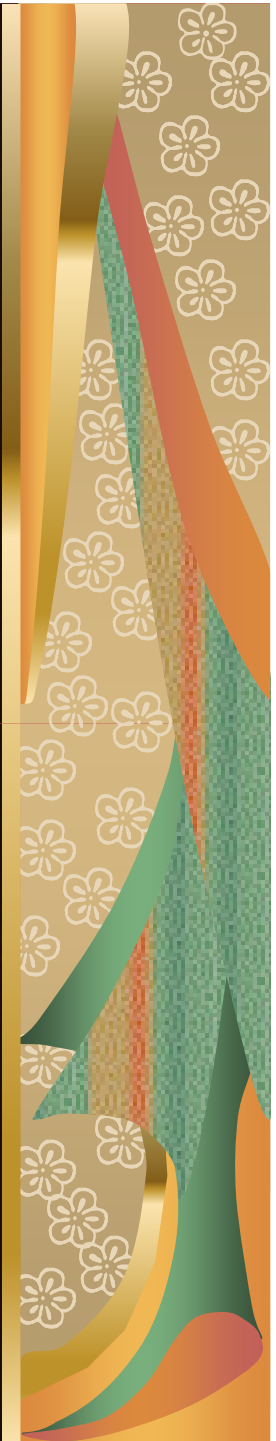
FINDINGS & DISCUSSIONS

1. Exposing learners to Science/IKS integrated lessons seem to have created much enthusiasm for school science.

For example, Learner E14 response on:

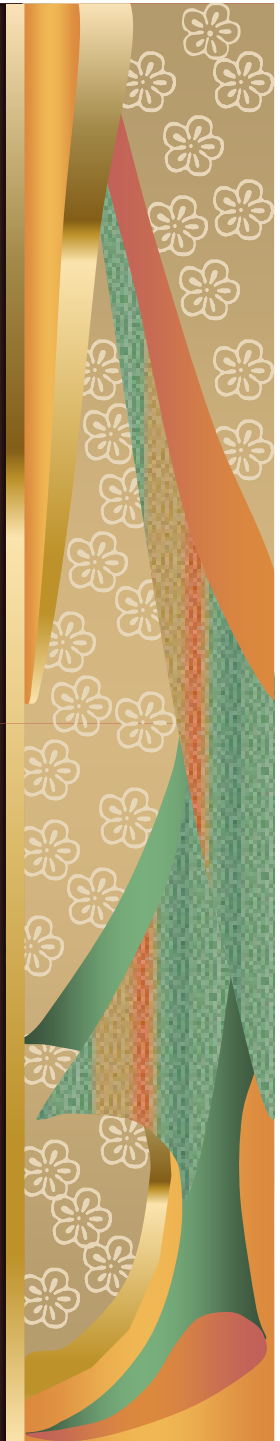
FGIQ 1: What is your opinion about including IK in the science syllabus at school – do you think that can work?

“When we were discussing about umqombothi we learned that our ancestors did have knowledge about science, because we found out that the things we were learning in class were not very different from those we are taught by our parents at home and in our culture.”



DISCUSSIONS 1

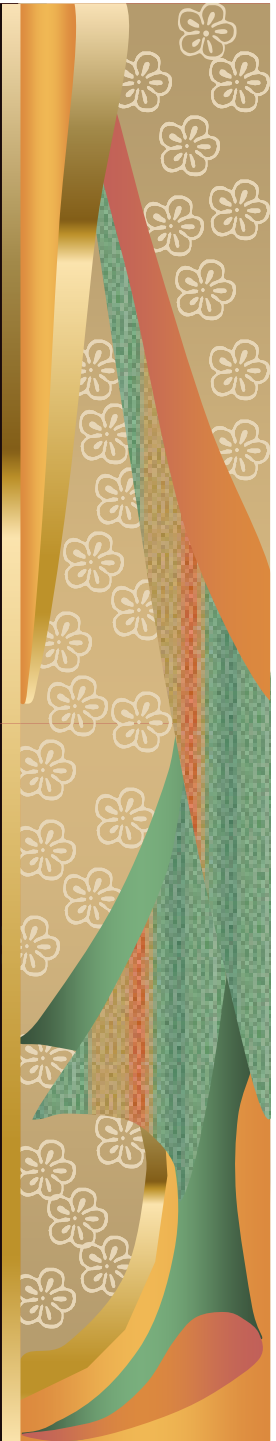
In support of the above the majority of the learners in the focus groups echoed the view that, besides them having enjoyed themselves in the construction of their own knowledge, they also felt that their culture or traditional practices have something also to contribute to the world of science. To corroborate the sentiments expressed by these learners, Chiappetta et al (1998) have argued that, since science occurred in a cultural context, “the culture of a science classroom is an unfamiliar one” (p.51). For culturally diverse learners to be successful, “school science must be related to their home culture” (ibid), hence the excitement experience by these learners. In the light of the New Curriculum in South Africa which calls for the integration of IKS with school science, it is imperative that strategies which promote the interfacing of the two worldviews (Fleer, 1999) be adopted for teaching and learning.



FINDINGS & DISCUSSIONS

2. As a result of the well planned and open-ended questioning that allowed different views and perspectives, the learners where able to (in addition to the school science knowledge they showed to possess) provide alternative worldviews as opposed to those they were being taught at school.

For example, Learner GP 1.1 in response to the question: Which one is more safer and healthier to drink between traditionally-made amasi and that which is sold commercially or between umqombothi and commercial beer?

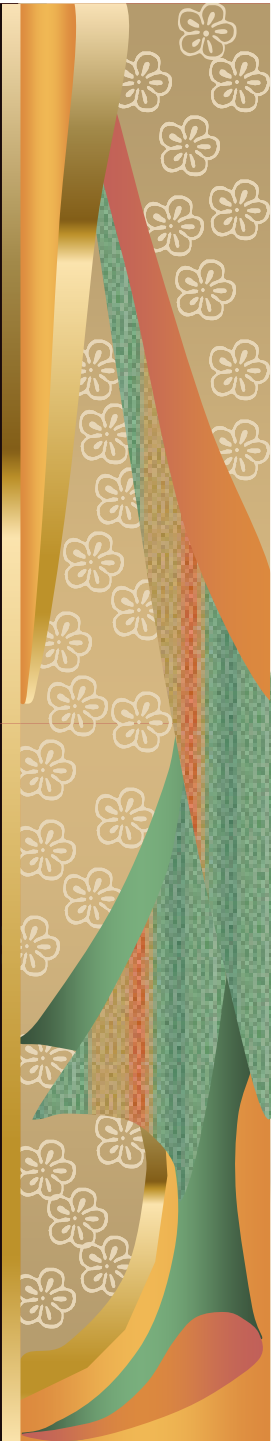


RESULTS FOR FINDINGS 2

Claim: “home-made amasi and traditional beer are healthier” (**C - traditional knowledge**).

Reason (evidence): “home-made amasi are healthier because they are not mixed with chemicals, colourants and also traditional beer are good in health”- (**B – School knowledge**)

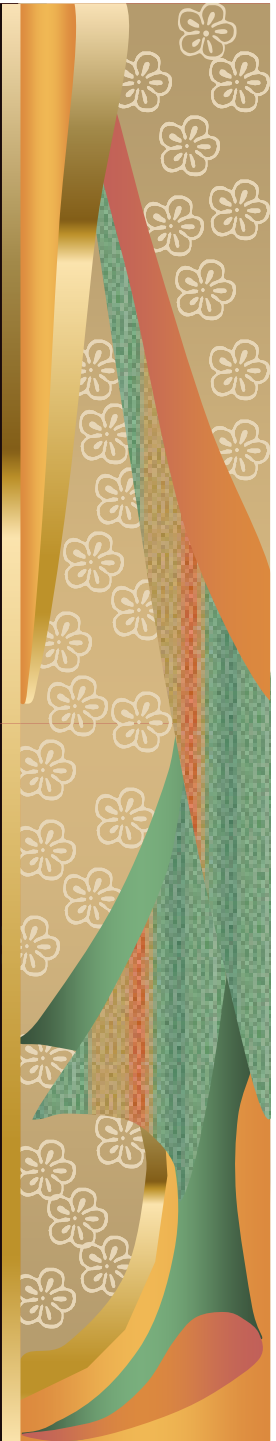
Warrants: “In home-made amasi there are no chemicals that can be the risk in health or you can't be allergic in it because it is not mixed with different chemicals that can be strong” – (**B – school knowledge**).



DISCUSSIONS 2

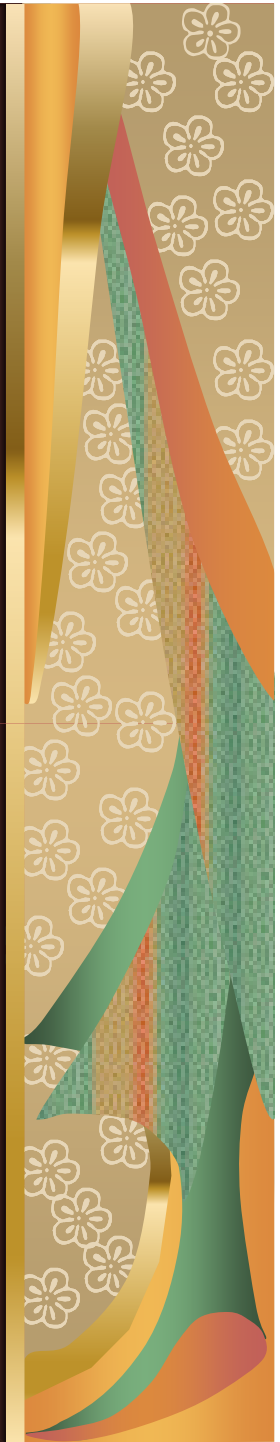
Simonneaux (2001) have also added that, learners do not just learn to argue constructively without any ground work being done by the teacher and adding that, "... students placed in a situation in which they have to argue their case are more likely to acquire the knowledge" (p. 904) which they can reproduce when called on to do so.

The above assertion has also been corroborated by the fact that, while all groups were able to favor one kind or another product whether traditionally prepared or commercially made, with good supportive evidence, TAP was observed to be at work throughout their arguments.



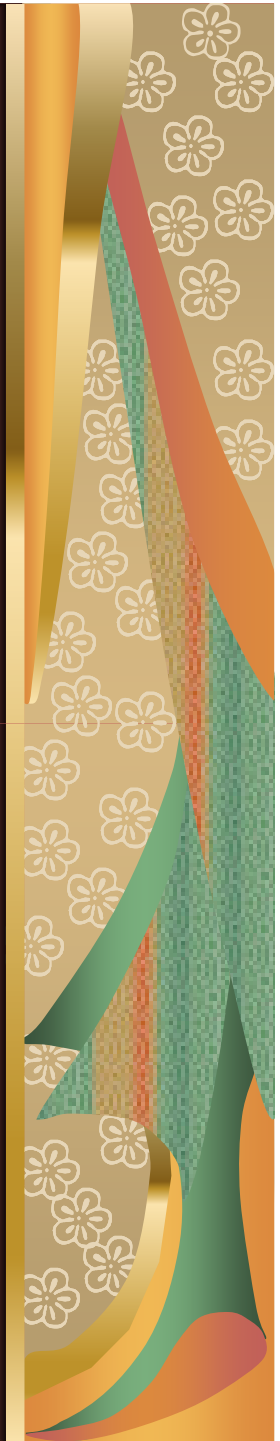
DISCUSSIONS 2 CONTINUED.

The other interest aspect is that, learner groups showed dualistic worldviews in the sense that they would make claims based on either their culture or school worldviews (e.g Group 1 and 2 - see class observations section) and yet hardly used evidence that is consonant with the view upon which the claim has been made. This observation seems to suggest that the learners did not necessarily see any clear distinctions between their traditional knowledge and science and thus did not have a problem of using one explanatory model against the other.



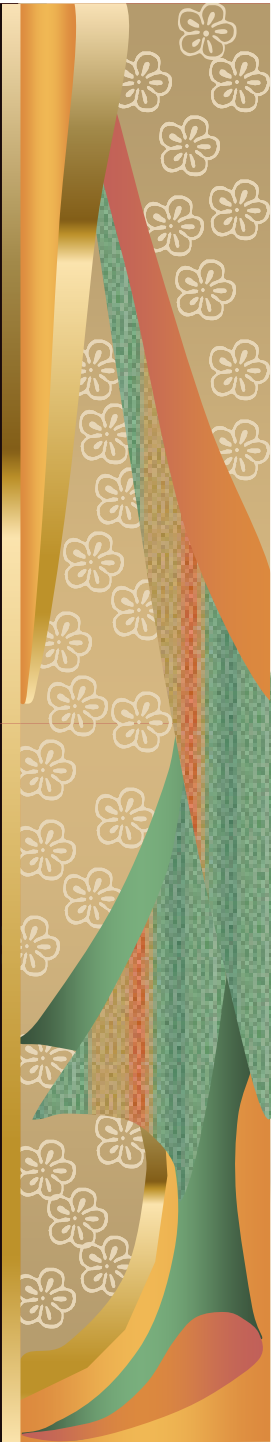
DISCUSSIONS 2 CONTINUED.

Onwu and Mosimege (2004) have also alluded to the failure of the integration of science with IKS with regard to the ‘engaging tensions’ (p. 1) where there were no mechanisms for learners to be afforded the opportunity to cross cultural borders. The observations made among the learners exposed to dialogical argumentation process is also in line with Ogunniyi (1988) view which states that, learners do hold dualistic worldviews without experiencing cognitive conflict from either worldview (e.g. science and IKS).



DISCUSSIONS 2 CONTINUED.

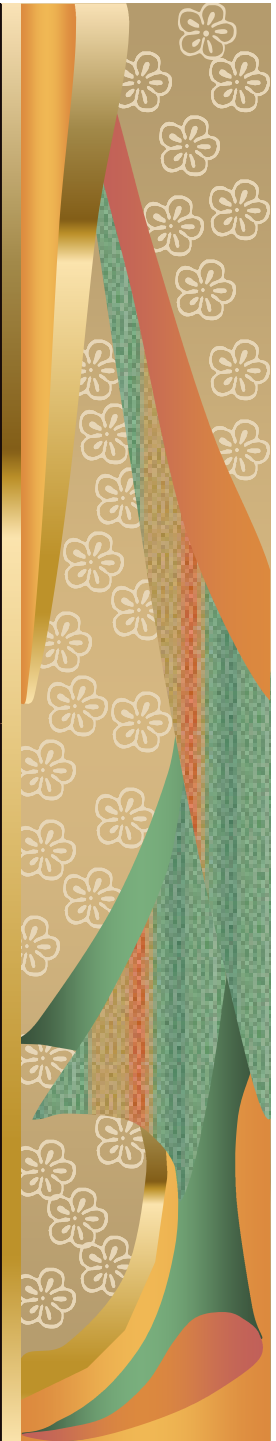
Similarly, the learners' alternative use of different worldviews in their claim versus evidence in their argumentation patterns is in line with the CAT's equipollent cognitive category which suggests that, in particular contexts, a learner or learners might experience equal cognitive forces from the two worldviews (science and IKS).



CHALLENGES & OPPORTUNITIES

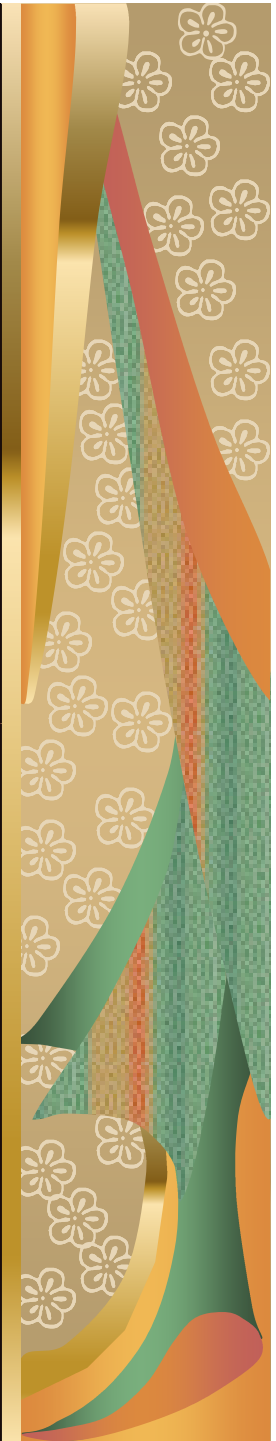
Introduction of an argumentative classroom in this study was quite a challenging in that the learners were more familiar with the educator-centered approach. Some of the difficulties that emerged were as follows:

- Designing and preparation of worksheets was an extra burden to the lesson plans and consumed more time than was envisaged.
- Worksheets consumed a lot of papers since writing on the board consumed extra time.
- Learners had to be taught to use an argumentation framework, because their arguments were unstructured and did not follow any rules.



CHALLENGES & OPPORTUNITIES

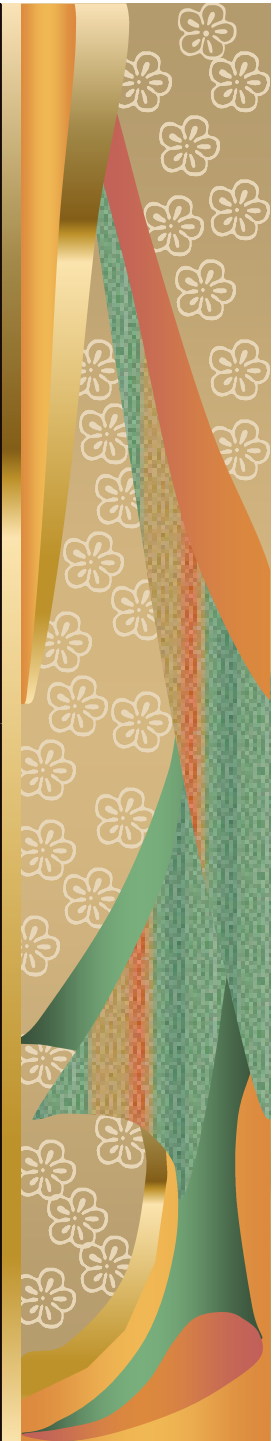
- Learners were tempted to copy from each other as they were used to an assessment system that made them believe that there could only be one answer.
- Controlling the learners' discussion and arguments seemed very difficult since the learners were enthusiastic and sometime emotional in the defense of their claims or beliefs.
- Time management for activities seemed to be a problem, because learners took considerable time to complete their given individual tasks.



ADVANTAGES OF DA-BT

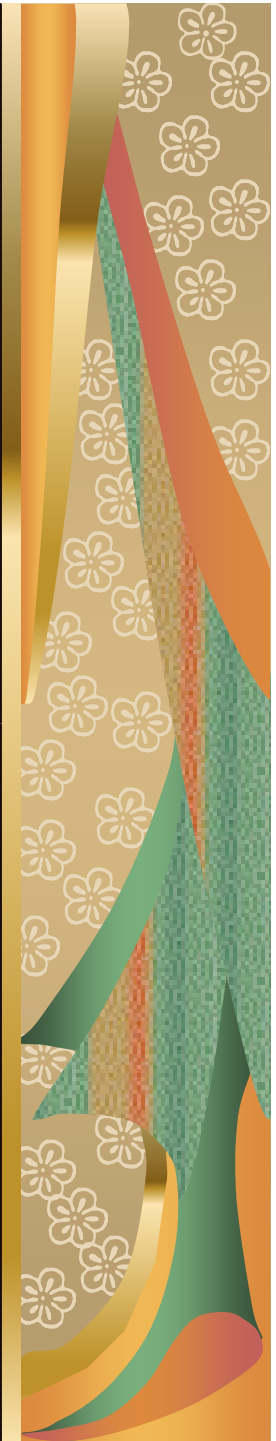
Although the class was a bit noisy and that not much seemed to have been covered at the end of each lesson, but learners seemed to have:

- Enjoyed the lesson, in that they were able to express themselves freely in the construction of their own knowledge.
- Made sense of the claims as they adduced reasons or the evidence for their beliefs or assertions.
- Understood each others' view points and in so doing clarified their understanding on a particular matter.



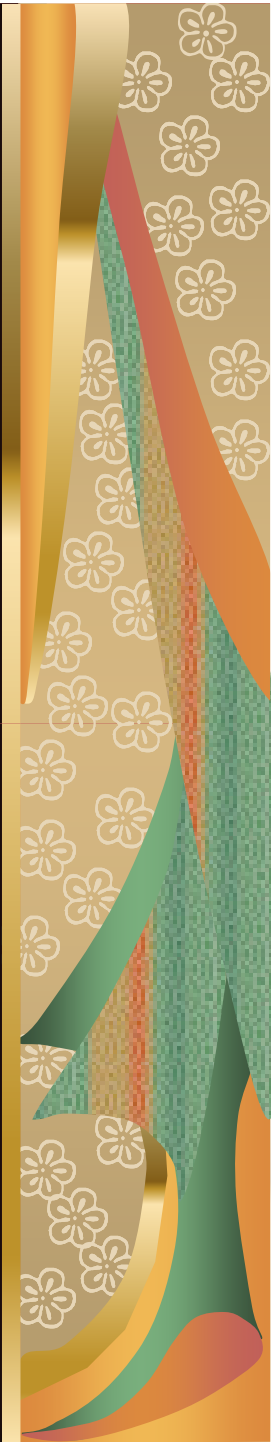
ADVANTAGES OF DA-BT

- Developed reasoning process skills. This probably helped them in evaluating scientific information.
- Developed an awareness of how argumentative scientific discourse is.
- Understood the limitations of their own arguments and thereby developed some relative understanding of NOS and NOIKS



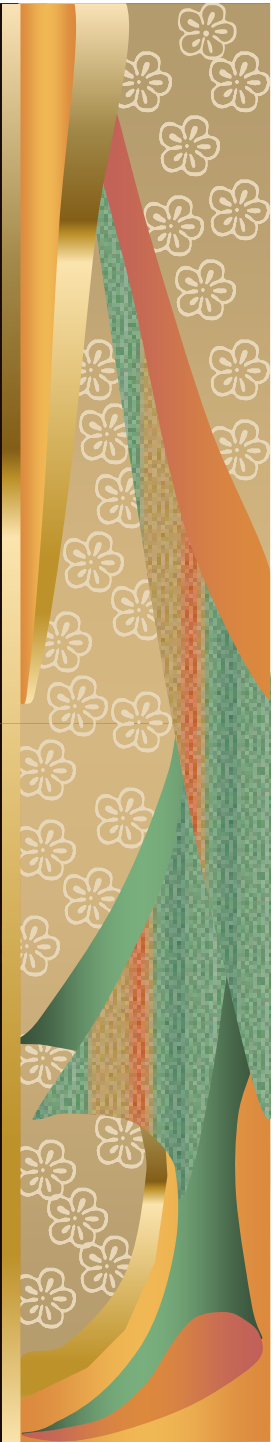
CONCLUSIONS

The focus group interviews corroborated the findings obtained in the classroom observations and hence it can be said that the argumentation-based teaching approach seemed to have enhanced the teacher and learners' awareness of and understanding of the Nature of Science (NOS) and the nature of IKS (NOIKS). The results further suggests that, without argumentation or allowing learners to express their views on any matter, it would be difficult if not impossible to enhance learners' awareness of and understanding of, and attitudes towards the NOS/NOIKS.



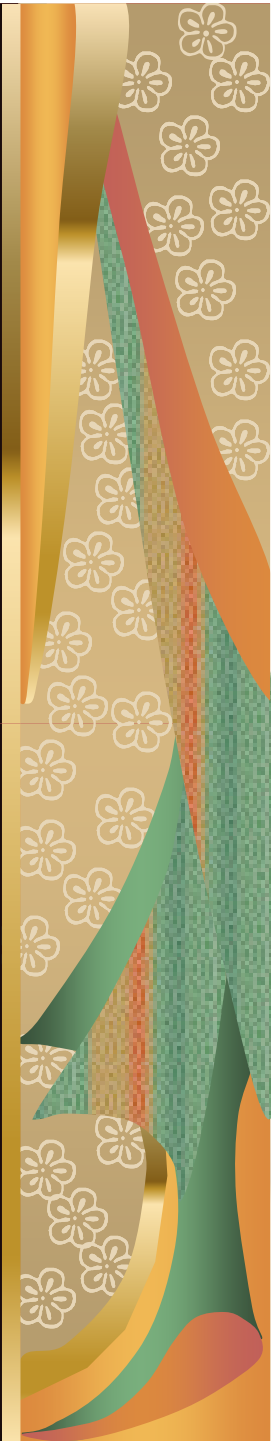
CONCLUSIONS CONTINUED

Although initially argumentation base teaching and learning materials seemed to have required a lot of time to prepare, having been prepared, they seemed to dramatically cut the teaching time for a specific topic when viewed over a longer period. This was so, as the majority of the learners seemed not to require any revision before going on the next lesson. In addition this teaching approach seemed also to be effective in facilitating a learner-centered environment which did not lead to learner cognitive conflict with science and IKS integration.



IMPLICATIONS

The experiences learned in this study have implications for policy and practice. With regard to policy, it is vital that science and IKS not be dichotomized and seen as separate knowledge. The second aspect is closely tied to the former in the sense that compartmentalizing of science content knowledge creates a lot of knowledge redundancy where learners might think that one concept only applies in one context and not the other, hence also making it difficult for both teachers and learners to recognize the science in their everyday lives and experiences. Lastly, DAI calls for well prepared lessons and trained teachers.



END OF PRESENTATION

Maz'enethole, ukwanda kwaliwa
ngumthakathi!

Imibuzo = Questions,

Ugxeko-luncomo = +criticism

lingcebiso = suggestions/advice

Enkosi = Thank You

