

Teacher-student interactions in science classrooms: Concept of communicative approach (2)

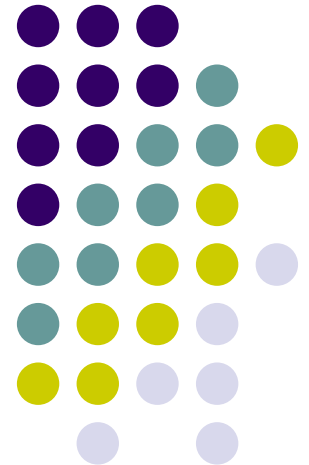
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CSSME, School of Education

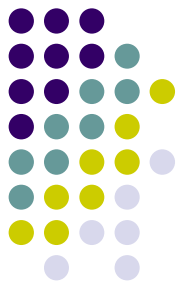
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Dialogic Science Teaching



Phil Scott, Jaume Ametller: Leeds Univ.

Neil Mercer, Lyn Dawe, Judith K. Staarman: Cambridge U.

Meaningful learning of science concepts



- recognising similarities and differences between everyday and scientific ideas
- understanding relationships between scientific concepts
- applying the scientific concepts in a range of different contexts.

...making links...fitting ideas together...applying ideas

Concept cartoon: bottle on shelf



The bottle is not moving. There are no forces on it

A

The only force on the bottle is the force of gravity pulling it downwards

B

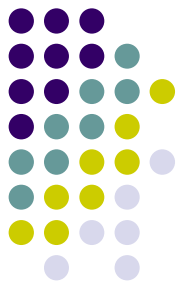
There are two forces on the bottle – the force of gravity and the push of the shelf upwards, which balances it.

C

A shelf cannot push. It is just in the way of the bottle and stops it falling.

D

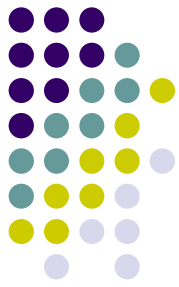
'A starting point'



Teacher: Now I was over there with Josie and with Ryan ...they were looking at this and I tell you what...they really didn't agree at all...So I'm going to ask them if they can lead off for us and just have a look at some of the ideas they talked about...

Josie: Well like, I don't think that a table can push. Cos gravity pulls, it's a force...but a table can't push upwards, it's just in the way of the erm...that's all.

'A starting point'



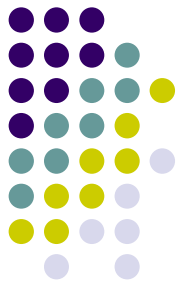
Teacher: Right. Let's have a listen to what she's saying there...She's talked about the force that a lot of you have talked about, *gravity*. But the disagreement between the two of them is whether the *table* can *do* anything.

Now I think when I was listening to Ryan that he was here. That there are two forces on the bottle the force of gravity and the push of the shelf up which balances it. And I think that Josie is here. A shelf cannot push it is just in the way of the bottle and it stops it falling.

Now let's use that as a starting point...

Non-interactive/dialogic

‘Anybody else...?’



Teacher: Anybody else like to join in with this one?

Zoe: I think it's, erm...there's two forces, because there has to be something that's holding it up that stops gravity pulling it down. So erm, the table must be pushing it up in some way.

Teacher: ...so you're kind of going that way [points to view C]. Let's ask some more people..

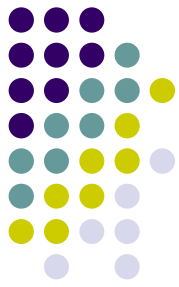
Interactive/dialogic



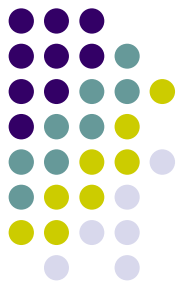
Two days later....

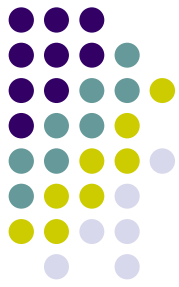
Teacher: I'd like to get you to think about one of the ideas that you really *argued* about on Monday... What was the idea that you were arguing about? Josie was in the middle of this and Jordan was in the middle of this argument. What were you arguing about?
Josie?

Josie: That a table can't push up.



Teacher: Yeah...it was this argument about the table not being able to push up to support the gravity force that was pulling down on that heavy bottle. What I want to do...I want to leave you this morning...with a picture of something that might help you to believe that *THAT* [knocking on the table] can push up.





The table is pushing

Teacher: What's he done to the shape of the balloon there Sean?

Sean: pushing it down...

Teacher: He's pushing it down. What's he done to the shape?

Sean: Flattened it.

Teacher: Flattened it. Now, he's only got one hand on there at the moment. Where on Earth is the other force that's changing the *shape*?

Holly: From the table.

Teach: Holly says the *table is* pushing. Levi what do you say?

Levi: I think the table is pushing

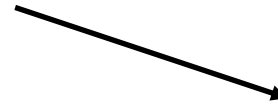
Teacher: The *table is* pushing. What do you say Penny?

Interactive/authoritative

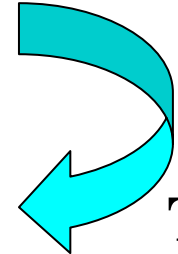
Shifts in communicative approach



Reviewing students' ideas
[Non-interactive/dialogic]



Exploring students' ideas
[Interactive/dialogic]



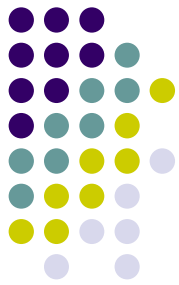
Turning
point

Introducing science view
[Interactive/authoritative]

Applying science view
[Interactive/auth.]
[Interactive/dialogic]

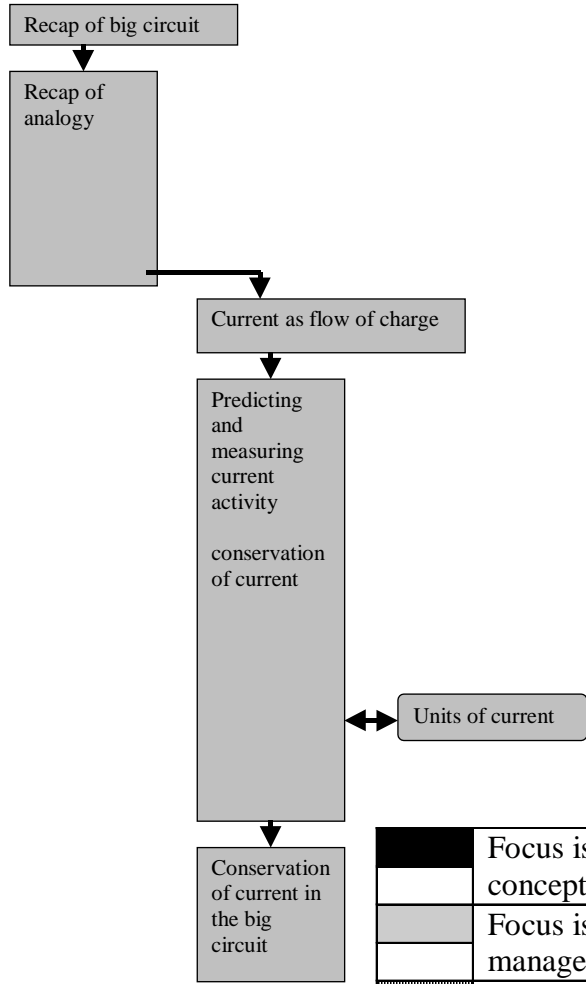


Lesson: as taught...as planned



Lesson 2 as taught

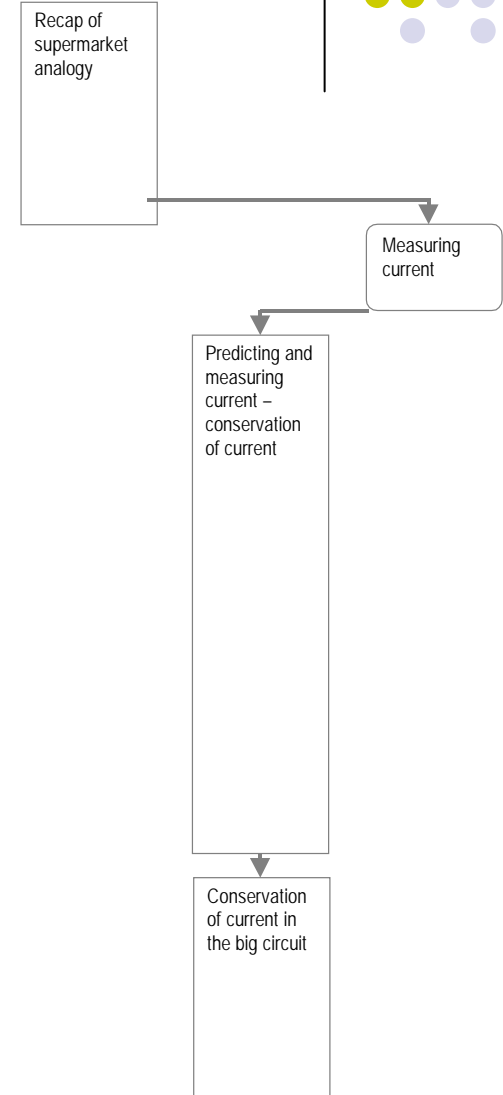
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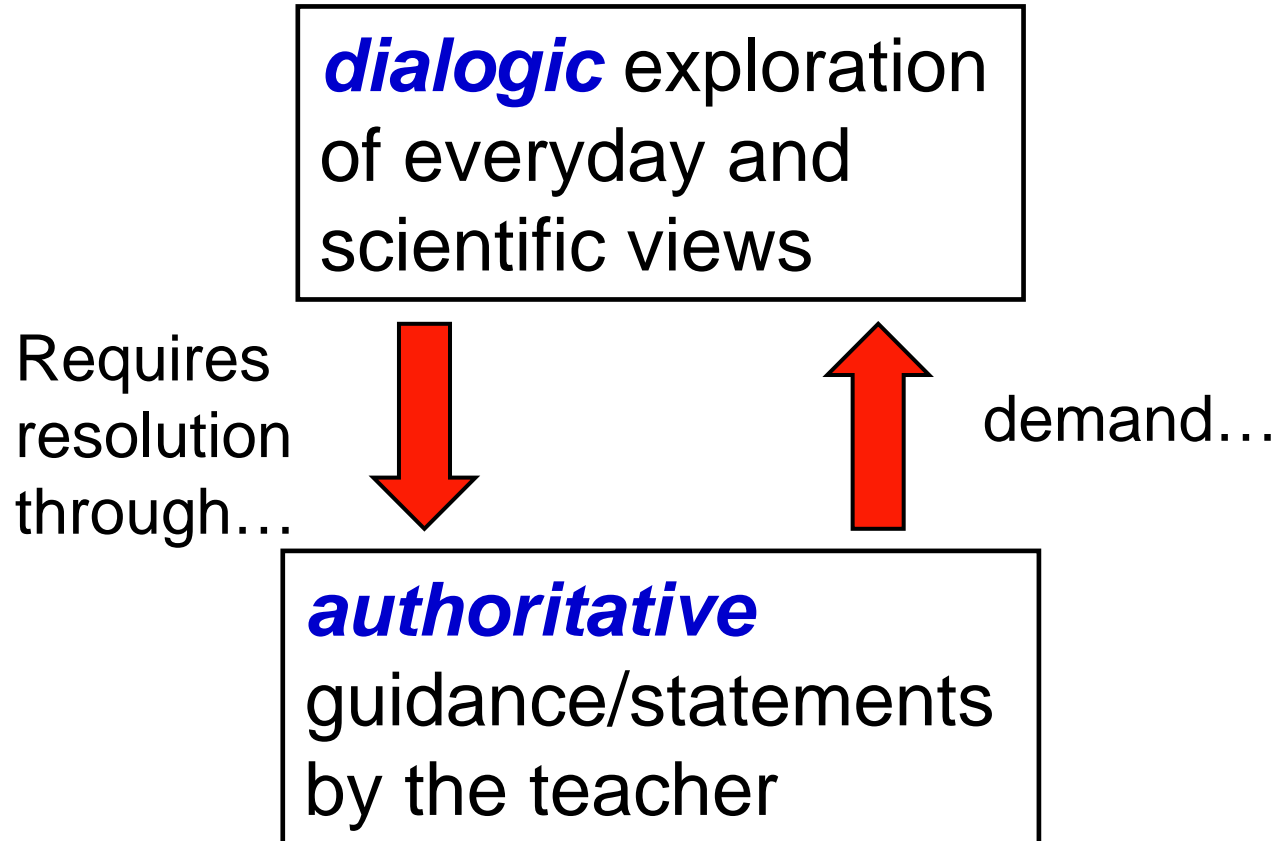
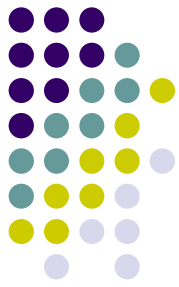
█	Focus is on target concepts
▨	Focus is on management
▨	Focus is on non-target knowledge or ideas

Lesson 2 as planned

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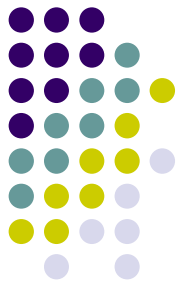


The relationship between dialogic and authoritative approaches



...each approach contains the 'seed' of the other

And what happened to Josie?



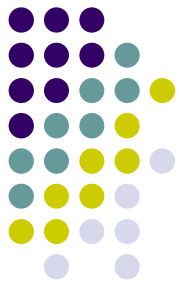
A 'clue' for the normal force....

Josie: The table with the bottle has this.

Teacher: Josie is using a picture we've been introduced to...just give us a bit more.

Josie: Like a bottle standing on a table has gravity on it and *something* keeping it up from the table.

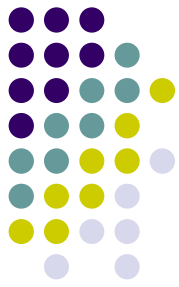
... other evidence of learning?



**Martin Nystrand:
Opening Dialogue (1997)**

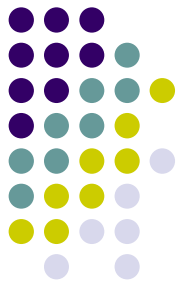
A large-scale study of the effects of patterns of classroom discourse on pupil learning in 400 English lessons in 25 USA high schools

Nystrand

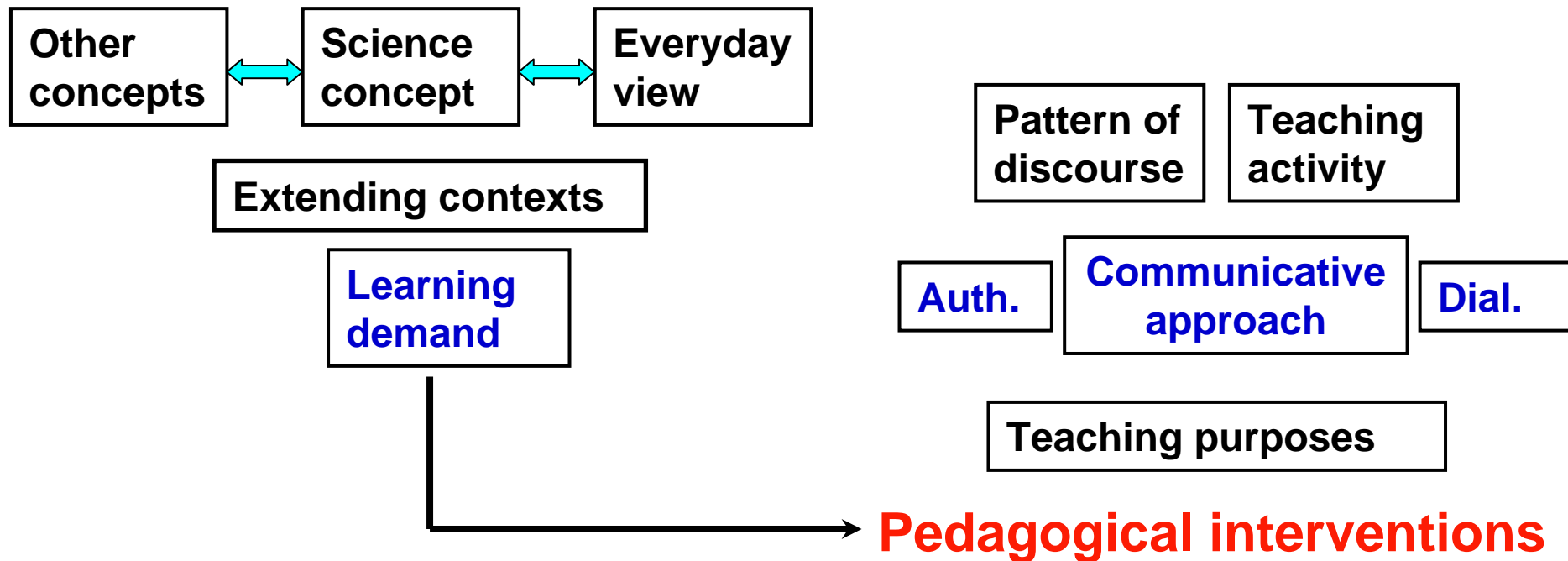


- The results support the hypothesis that dialogically organised instruction is superior to monologically organised instruction in promoting pupil learning
- Recitational patterns of talk **[interactive/authoritative]** were found to be overwhelmingly prevalent and to have a negative effect on learning

A sociocultural framework: teaching and learning science



Working on knowledge



'Bottle on shelf': the teacher...



Domain specific knowledge:

- Students' everyday views and relation to scientific account
- Possible teaching activities to engage students in dialogue (concept cartoon)
- Possible approach to introducing the scientific view (balloon demo)
- Productive questions to probe students' understandings.

Pedagogical skills:

- Sustain a line of talking and thinking as ideas are introduced, reviewed, consolidated in a *cumulative* process (Alexander, 2001).
- Monitor and keep track of student understandings
- Choreograph shifts in communicative approach: opening up/closing down classroom discourse....linked to teaching purposes.
- Work within existing assessment system

Management skills:

- Allow sufficient time for exploration of views
- Develop a supportive working atmosphere: where students are happy to express their views

A beginner teacher...

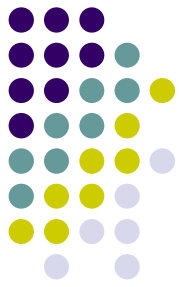


Through my analysis of communicative approaches, I am now aware of how limiting it can be to the children to simply rely upon one method and have tried to vary the approach much more...

Both the pupils and myself have enjoyed lessons more and I believe that the children have learned to express themselves much more coherently.

While I do not claim to have mastered them, having the knowledge of the four approaches and the confidence to experiment are the first steps towards doing this.

But things don't always work out....



Teacher: We have looked at mixtures already. Can anybody give me an example of a mixture?

Jas: Beans and Rice

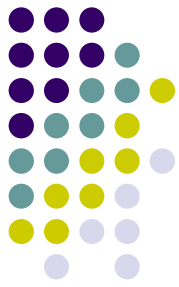
Jim: Dolly mixtures

Teacher: We are going to look at separating mixtures Un - mixing or sorting out. Can you think of things to sort out at home? Hailey?

Hailey: My room, my Mum says Hailey you have to make sure your room is tidy or you won't be able to go shopping with me at the weekend.

Teacher: Untidy room, what would be mixed up?

But things don't always work out....



Jim: Your socks and magazines

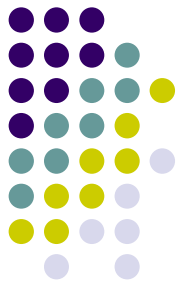
Teacher: So Hailey might need to separate her socks and magazines

Hailey: More likely my tops and hair bands because Mum says, 'Hailey Bishop! Don't you come running to me when you can't find a hair band'.

Teacher: You have briefly looked at filtering in class as one way of separating a mixture. Using a paper towel and the sugar and water solution. Can anyone give me examples of filters or filtering...

Silence!!

Ongoing work: CSSME Leeds



Leeds Science Teaching Design and Development Group

Working with 3 school science departments in Leeds on these teaching approaches...for a sustained period of time.

John Leach, Phil Scott, Jaume Ametller, Jenny Lewis, Jim Ryder

Cultural Aspects of multimodality in the classroom

Jaume Ametller, Prof Masakata Ogawa, Kobe University, Japan.

Development project: DfES, National Strategy

‘Interactive teaching in science classrooms’

Electric Circuits; Particles; Forces; Plant Nutrition; Genetics

Phil Scott, Jaume Ametller, Katie Hall, John Leach, Jenny Lewis, Jim Ryder

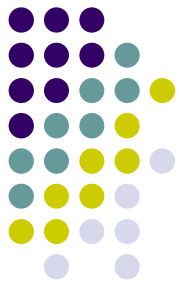
Development project: Institute of Physics

‘Supporting physics teaching 11-14’

CD based resources for non-specialist teachers of physics

Phil Scott

PhD studies: CSSME Leeds



Asma Al-Mahrouqi

Nature of dialogue in Omani science classes under the system of new basic education

Jonathan Emberton

Investigating the relationship between Dialogic Teaching and Meaningful Learning in Science

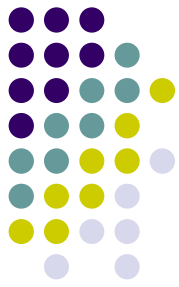
Mohammed Alzaghbi

Instructional design: the development, implementation and evaluation of teaching about plant nutrition in Saudi Arabia.

Nur Jayhan Ahmad

Teaching And Learning Introductory Electrochemistry In Malaysian Secondary Schools.

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