Cultivating a Growth Mindset

- Teaching with dialogue to grow intelligence -

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internationally renowned educator and researcher who was not afraid to challenge conventions around educational research as he sought to make it more authentic of what really happens in classrooms

Did you know?

Intelligence can grow

This Presentation aims to:

- **Define what Intelligence is;**
- **Discuss the evidence that Intelligence can grow;**
    1. Cognitive Acceleration in Science and Mathematics
    2. Accountable Talk
    3. Exploratory Talk
    4. Philosophy for Children (P4C)
- **Outline how teachers can promote discourse-intensive instruction to promote a Growth Mindset.**

What is Intelligence?

"By 'intelligence' we mean more than acquiring a fixed body of knowledge. We mean the ability to reason, process, interpret, and ultimately do something with new information. We claim ***intelligence can grow.***"

(Resnick & Schantz, 2015, p. 341)

1. **Cognitive acceleration** (Adey & Shayer, 2015)

Three core principles:

1

COGNITIVE CONFLICT
When students are challenged to reconcile anomalous information

2

SOCIAL CONSTRUCTION
Student discussion and argumentation is encouraged with the teacher playing a critical role

3

METACOGNITION
Students encouraged to reflect on their own thinking and learning processes

Research findings

(Adey & Shayer, 2015)

Cognitive Acceleration through Science Education (CASE) and through Mathematics Education (CAME) consistently demonstrated gains:

Adey and Shayer (2015)

"A consistent picture emerges of sustained, substantial, long-term effect on students' intellectual development. Where the results were delayed and/or show transfer to other subjects, we take that to indicate that the intervention had a positive effect on students' general cognitive ability. On the basis of these results, we argue that general intelligence is plastic and that the three pillars of CA work to increase it" (p. 137).

2. Accountable Talk (Resnick et al., 2010)

Research findings

Project Challenge – a four-year intervention designed to identify students entering fourth grade who had potential talent in mathematics and to provide them with a challenging mathematics curriculum. The project was located in a low-income district in the US. Five cohorts of 100 students participated each year in the program with over 76% of participants of average ability (Stanine scores 5-7) as measured on the Naglieri Non-verbal Abilities Test.

O'Connor, Michaels & Chapin (2015)

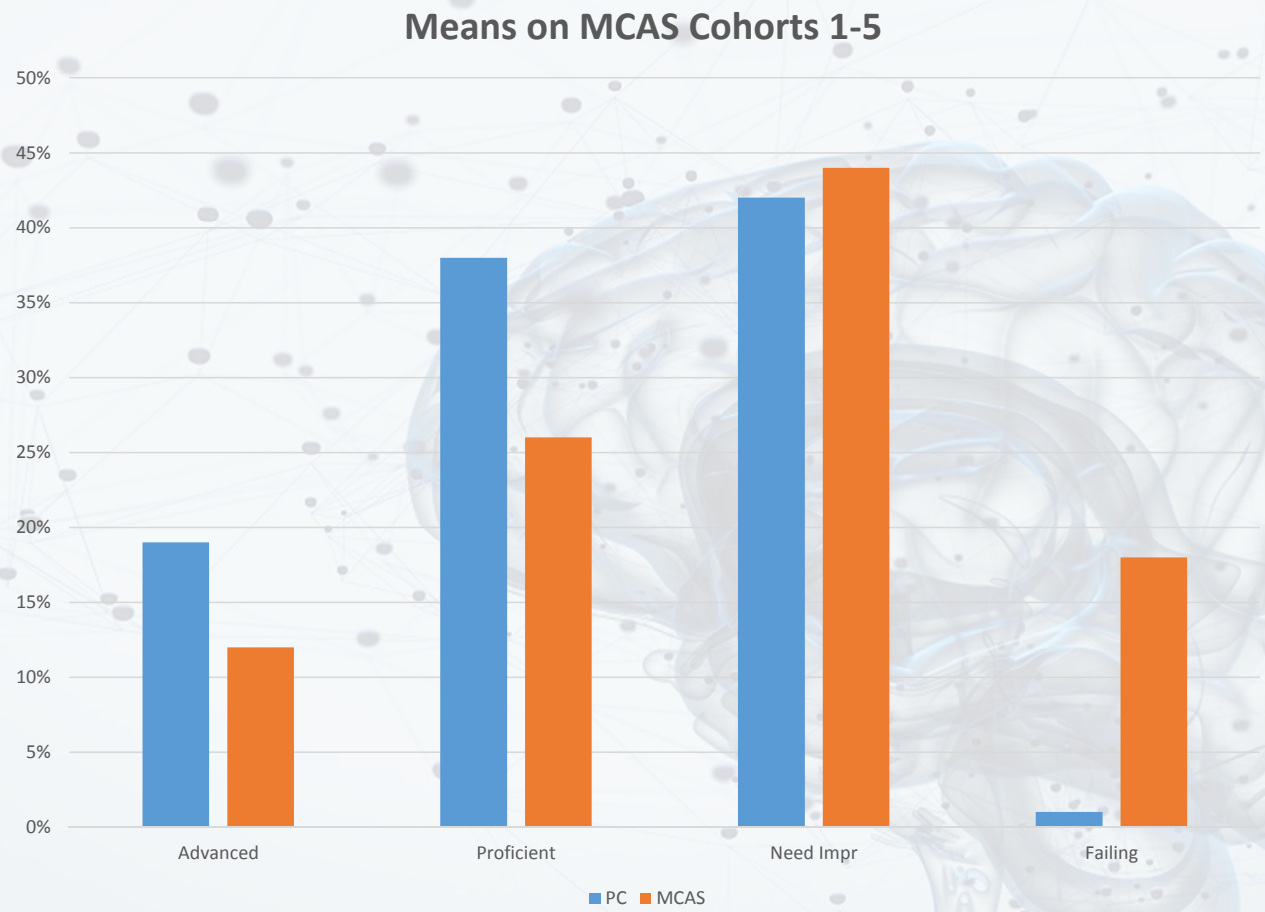


Figure1: Means for fourth-grade Massachusetts Comprehensive Assessment System mathematics performance for students in Project Challenge Cohorts 1-5 compared with state-level data for the same years.

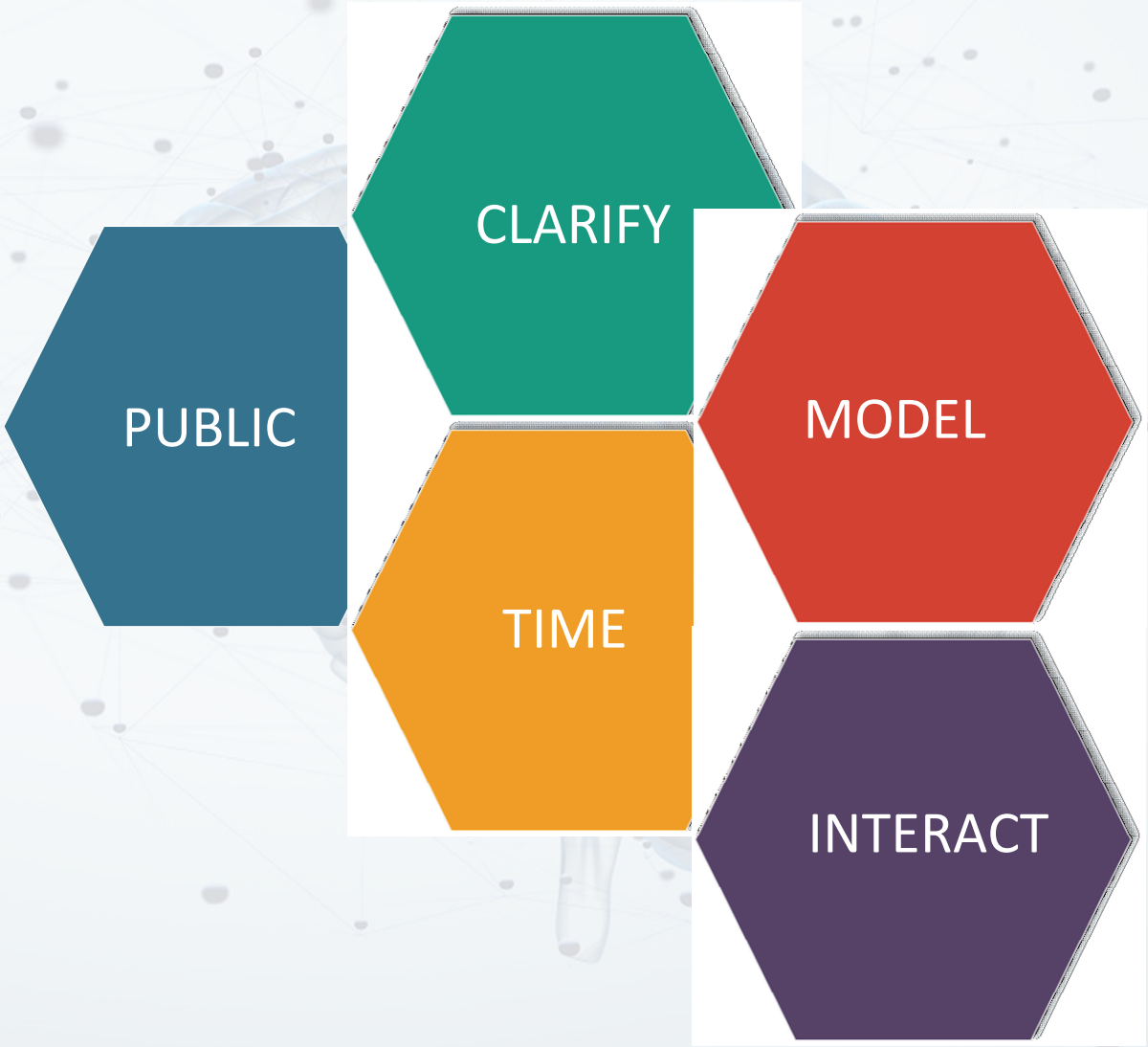
Talk Moves

Teacher initiates discussion

Deliberative and discursive

Re-voicing

The advantages



Reflective Discourse

Students learn to :

- explain reasoning
- make generalisations
- connect concepts, strategies or representations

Dialogic-interactive exchanges:

- teacher and students consider ideas and positions
- supports learning and improved cognitive performance

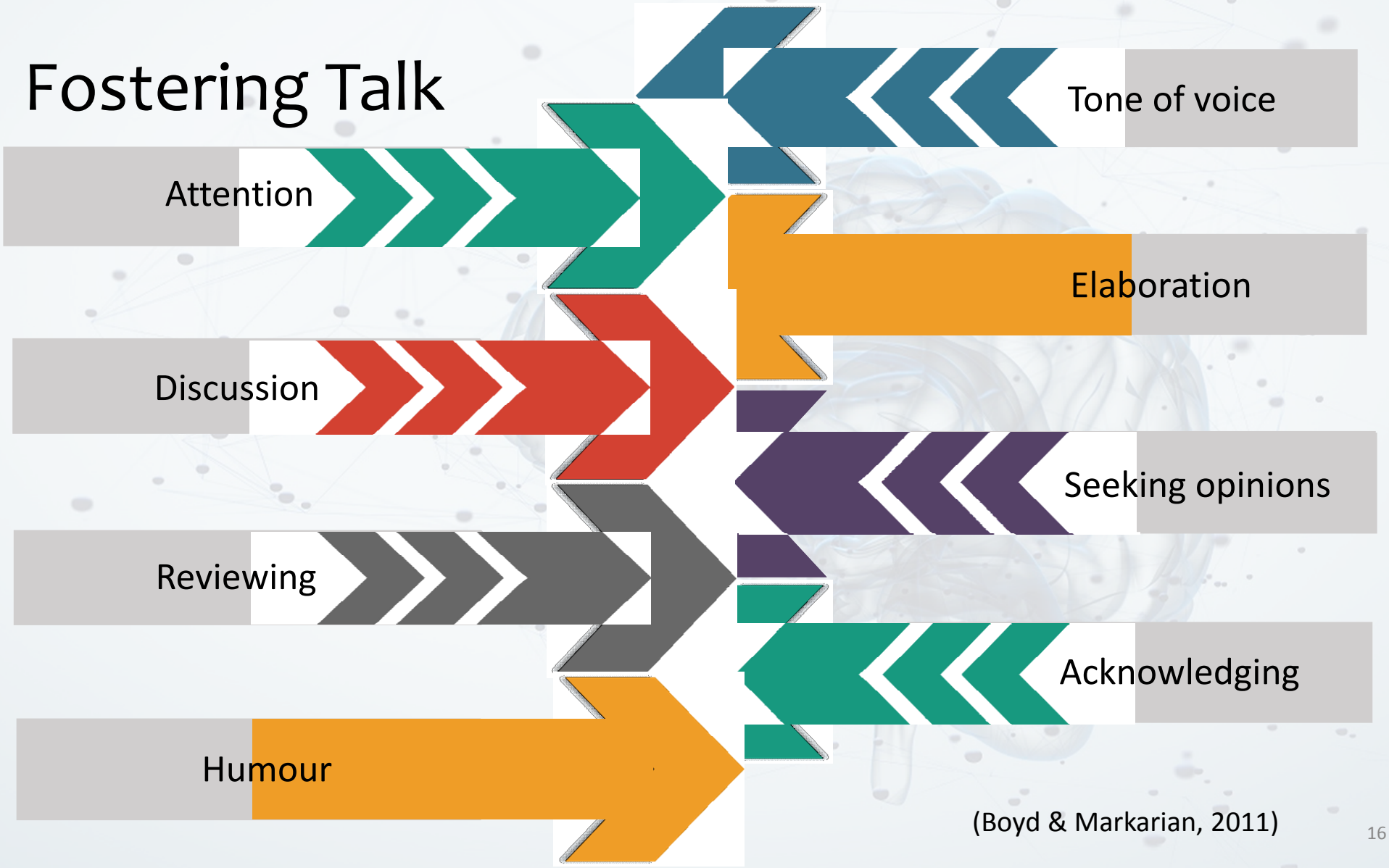
(Resnick et al., 2010)

Intelligence grows

- when students have opportunities to work in classrooms where teachers actively teach students how to engage critically and constructively with others' ideas, challenge perspectives, and discuss alternative propositions. These are important ***discourse moves*** that students need to learn if they are to talk and reason effectively together.

- when student have opportunities to engage in ***discourse-intensive instruction***, they realise that the thinking process itself is valued and their comments are important. In these classrooms, students learn to develop a ***growth mindset*** where working hard to learn new things makes you smarter – it makes your brain grow new connections (Resnick et al., 2010).

Fostering Talk



(Boyd & Markarian, 2011)

3. **Exploratory Talk** (Mercer & Littleton, 2007)

Teacher Role

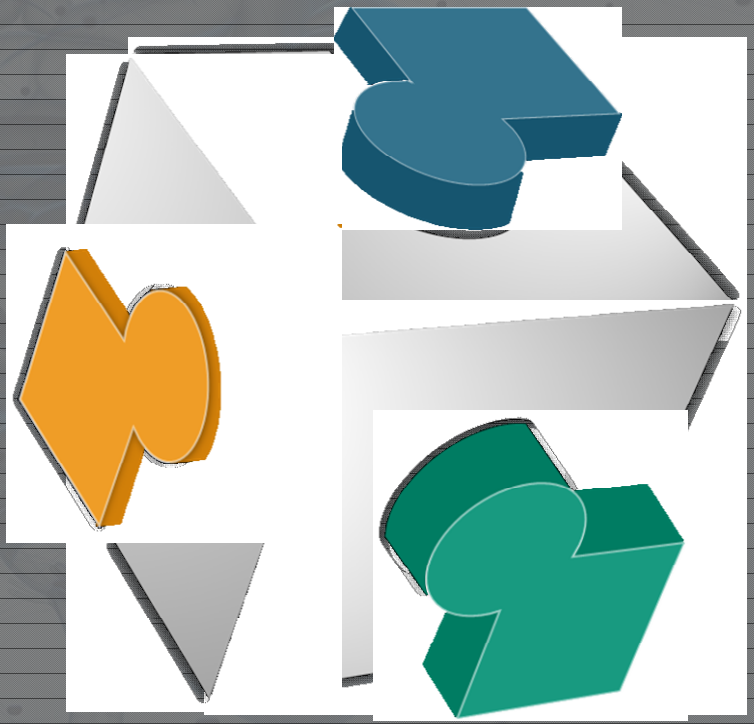
- Encourage
- Model
- Provide Opportunities

Types of Talk

Cumulative

Disputational

Exploratory



(Mercer & Littleton, 2007)

What the research says

Mercer and colleagues, using the **Ravens tests of non-verbal reasoning** because they are culturally neutral and they correlate highly with academic achievement and with “g” (general intelligence), have consistently shown that students in classes that implement Exploratory Talk as a way of expressing and sharing their reasoning during problem-solving activities obtained significantly higher scores (both at the group and individual level) than peers who had not used Exploratory Talk in their discussions.

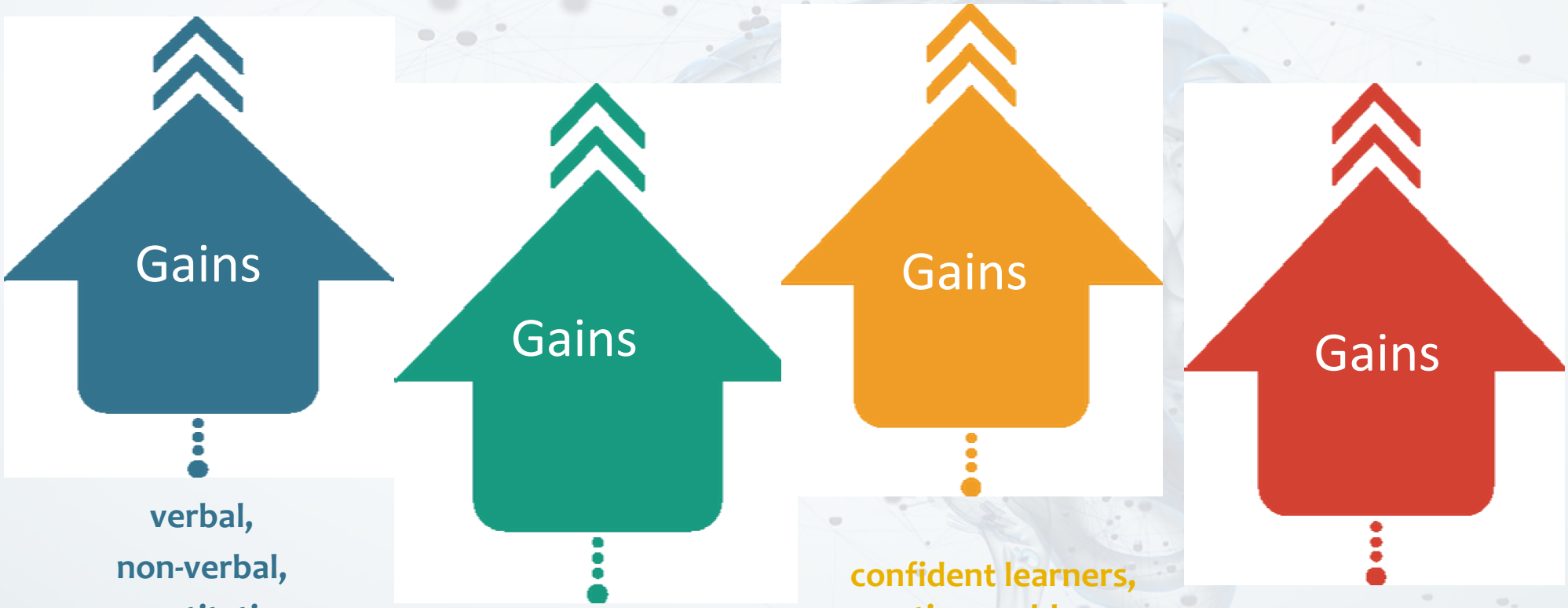
Effective teachers

listen to their students and acknowledge the experiences they bring to the classroom, help students to engage in more meaningful and insightful educational discussions. It is the ***recursive nature of these dialogic exchanges*** between teachers and students that contributes to academically productive talk and enhanced cognitive abilities and social competencies that transfer across contexts and school settings.

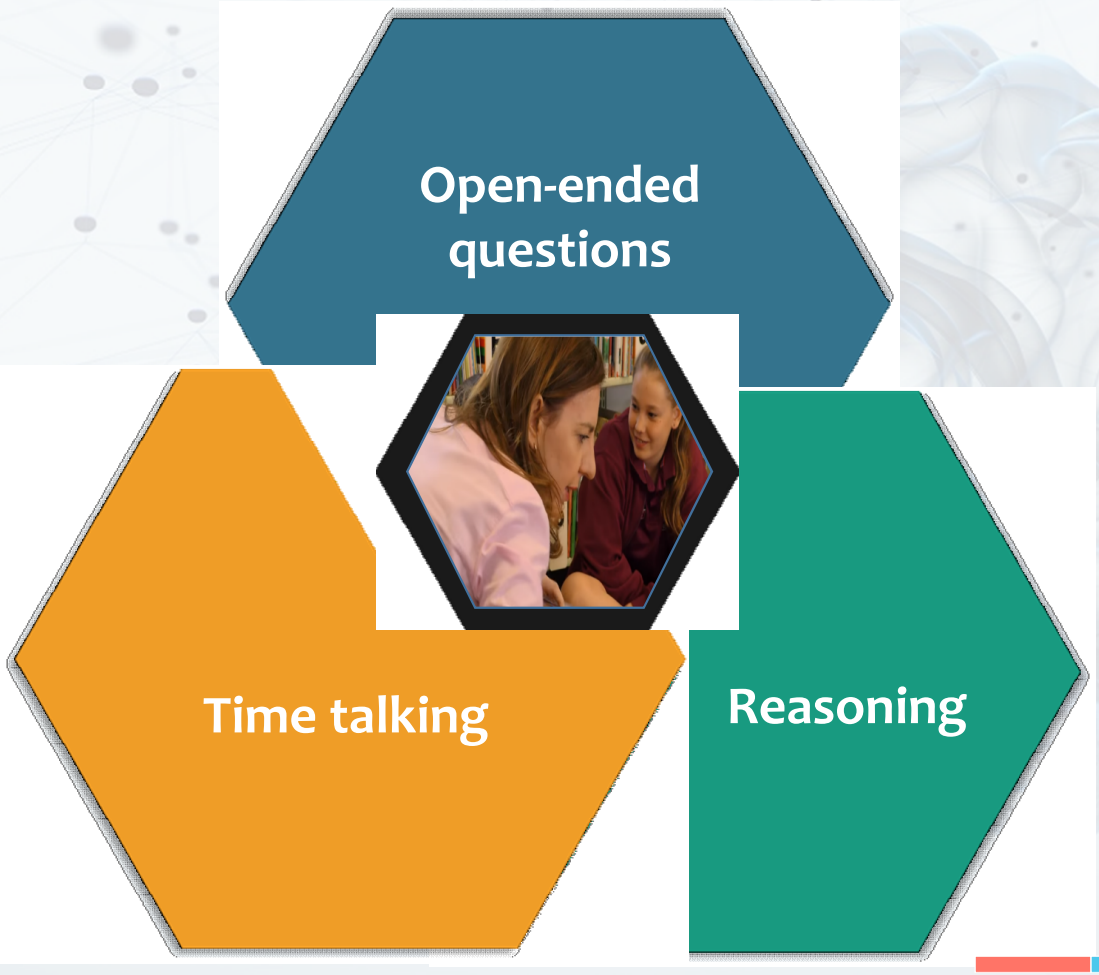
4. Philosophy for Children

Philosophy for Children (P4C) (Lipman, 1988) aims to teach students how to think for themselves and make informed choices as they engage in collaborate discussions on socially-relevant topics.

Research Findings (Topping & Trickey, 2014)



In P4C classrooms



Dialogic Teaching

(Alexander, 2008)

Teacher's role in promoting dialogue

Teaching students to engage critically and constructively with other's ideas, ask and answer questions, and challenge and contest alternative propositions are important dialogical skills if students are to talk and reason effectively together

(Rojas-Drummond & Mercer, 2003).

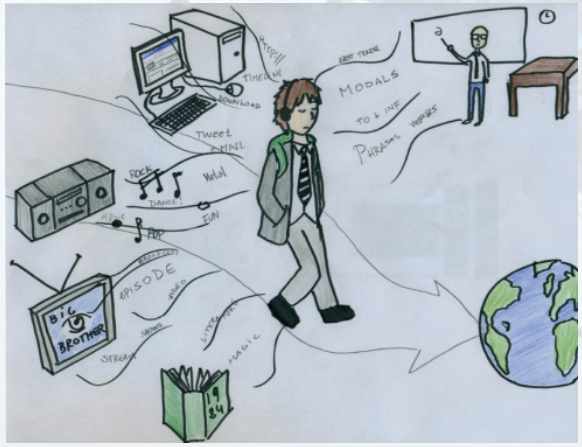
Specific dialogic interactions

1. Challenges children's understanding
2. Reasons are required
3. Metacognitive thinking
4. Confronts discrepancies
5. Focuses on issue
6. Prompts
7. Poses tentative questions
8. Scaffolds connections
9. Open questions

Some recent research on language used in cooperative, inquiry-based science

Purpose

To determine the effects of teacher-introduced multimodal representations and discourse on students' task engagement and use of scientific language during two, cooperative inquiry-based science units.



(Gillies & Balfour, 2017)

Foci of study

Behaviours associated with effective learning

- Use of different visual and embodied representations
- Types of language used
- Task engagement
- Scientific language

Question

- Is there a difference between effective and very effective teachers in their use of representations and language?

Question

- Is there a difference in the levels of task engagement, use of scientific language and achievement by students in these teachers' classrooms?