

Cognitive acceleration in primary science teacher education:

catching-up at third level



Πολλ' οἶδ' ἄλώπηξ,
ἄλλ' ἐχῖνος ἐν μέγα.
Archilochos (ca. 650 BC)

Thoughtful question 1

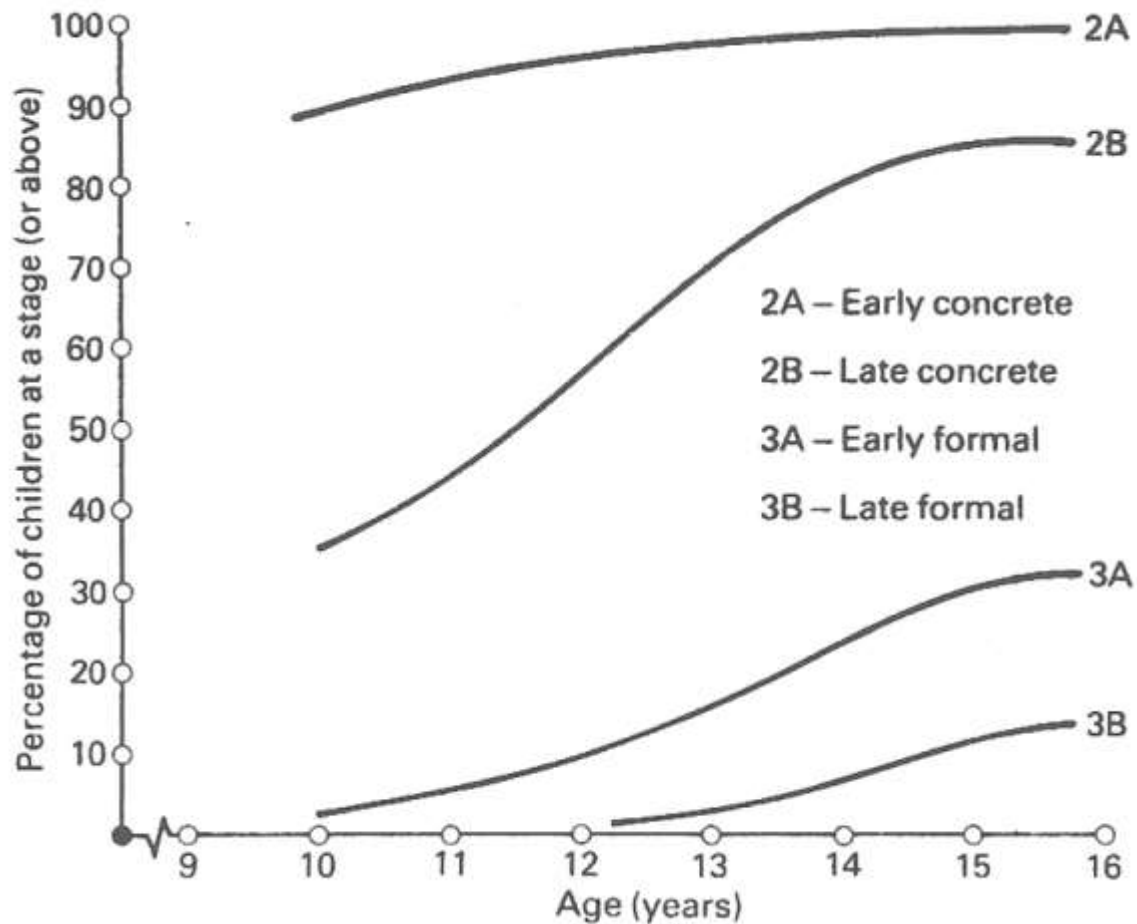
How much should a primary teacher know?

Previous / current research in Ireland

- Maume (1998) – CASE 11-14 in Transition year only
- Gallagher (2008) – LTEY Infants (4 – 5 years) in the three schemata of classification, seriation, and causality
- McCormack (2009) – CASE 11-14 across 1' – 2' transition
- Ryan (2014) – CASE 11-14 - metacognition
- McCloughlin (1997 – date) adapting existing lessons to the CASE “pillars” at three levels (secondary, and from 2000 primary and tertiary)

Thoughtful question 2

Would you expect a 5th class child to have a higher cognitive level than an undergraduate student teacher?



Proportion of children at different Piagetian stages in a representative British child population 10 – 16 years (CSMS)

13. a)



How do you think Archimedes measured the old and the new crowns' volumes to compare them, using a measuring cylinder ?

.....

.....

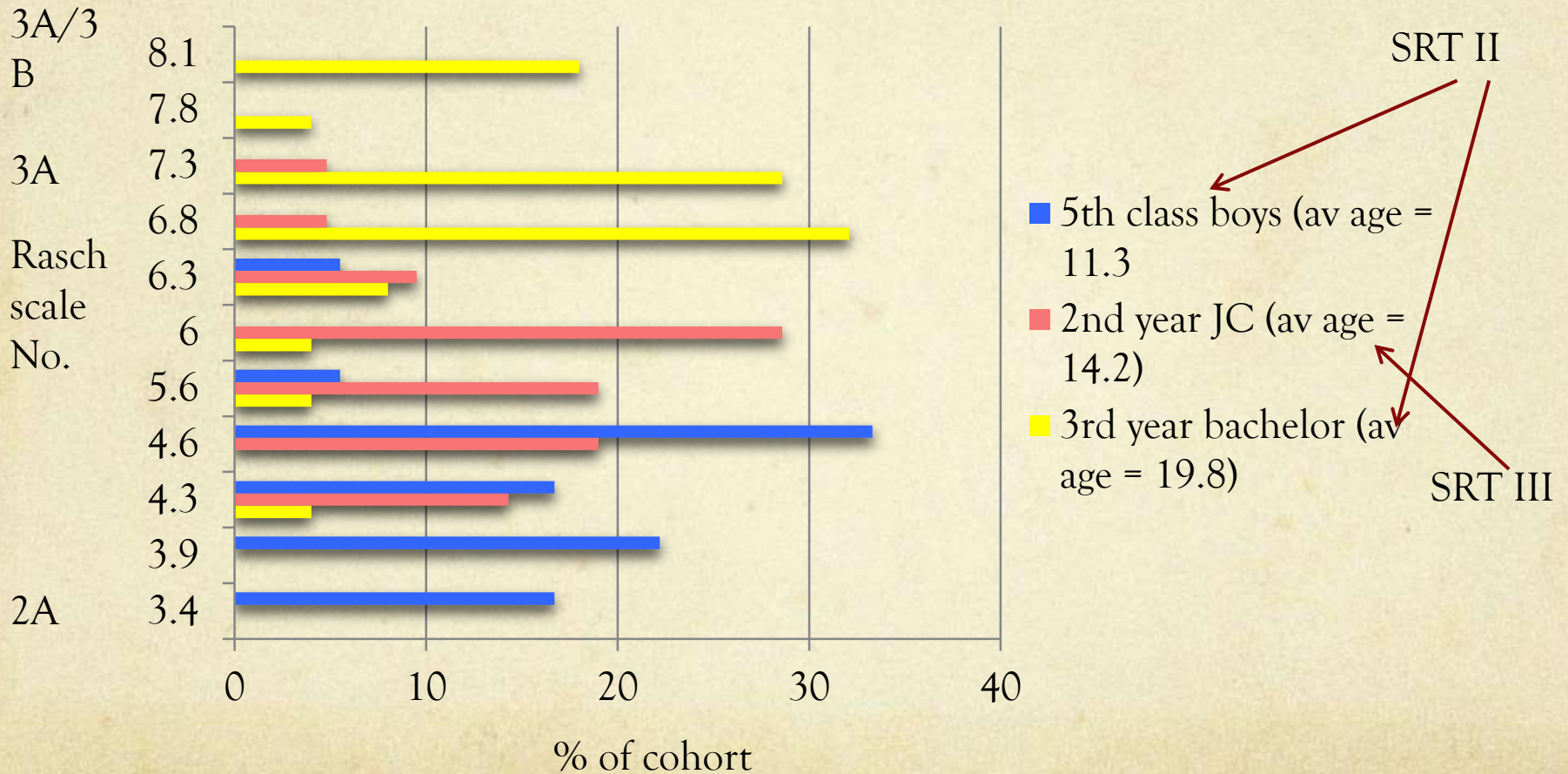
b) Archimedes then weighed the two crowns and found that the new, bigger crown weighed more than the old one. Nevertheless he said that the new crown had some lighter metal in it.

How do you think he worked it out?

.....

.....

Piagetian Levels in three typical samples



CAO Points

- General Nursing 420
- Law 530
- Structural Engineering 400
- Software development 300
- Biomedical Engineering 440
- Primary Teaching 460

Thoughtful question 3

Should we improve the cognitive level of the student teachers?

One approach

Students on an elective course, $n=74$, did show a general (proportion of students achieving 3A or 3B) 'improvement' of cognitive level after 36 hours of CASE 11-14 lessons (plus reflections) and having to teach 3 CASE lessons (plus evaluations) on teaching practice, and write an essay on the CASE methodology.
(McCloughlin, forthcoming)

Conclusion

- Student teachers have too great a spread of cognitive levels given their educational background.
- It is recognised that some student teachers have a deficit in content and/or skills.
- Science methods courses do not often seek to remediate knowledge deficits or skills deficits in science – they usually try to provide ‘experiences’ for students to become ‘confident’ in science in order to develop a science pedagogy.
- The general principle of ‘improvement’ or ‘acceleration’ (a higher level sooner) is mediated through a different way of teaching (invoking the 5 pillars: concrete preparation, social construction, bridging, metacognition, cognitive conflict) rather than just teaching / transmitting more content (“the one big thing”).
- But, science content and skills deficits can be addressed by engaging in a CASE-informed ITT course.