Stretching able science students in school: some implications for higher education

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Giftedness in science education & in science

Science education: ‘Those who achieve, or who have the ability to achieve, at a level significantly in advance of the average for their year group in school’

Science: ‘Those who achieve, or who have the ability to achieve, at a level significantly in advance of their peer group of scientists’

Implication for higher education: Seek out the manifestations of giftedness in science education and in science and bring them closer together

Identifying giftedness

Science education:

- attainment
- IQ tests
- observation

Science:

- performance at scientific work

Implication for higher education: watching and discussion by interested staff

Why does giftedness in science education go undetected?

Non-engagement by students:

-sensory impairment

- learning difficulties: dyslexia, dyspraxia, aphasia, dysgraphia

-chronic illness

Underachievement by students

-low self-esteem; emotional distress, peer pressure

Non-production by students

- cultural repression

Implication for higher education: effective personal tutoring

What are some characteristics of those who are gifted in science education?

Scientific curiosity:

- hobbies requiring scientific knowledge; active interest in natural phenomena; quality of questioning

Distinctive cognitive abilities:

-rapid mastery of novel material; ability to connect concepts and specific facts; produce models, predictions, explanations

Display metacognitive maturity

- show sustained interest; concentrate on the matter in hand; reflect on own reasoning; produce high-quality work.

Making suitable provision for the gifted in science education / science

Engage them in a story

Require genuine enquiries to be made

Require higher-order thinking

Facilitate self-regulation of learning

Use a variety of teaching strategies

Require work to be produced for an audience

Overall: Develop key skills

The use of metaphor and analogy

The exercise of visualization

Develop ‘communities of learners’