‘I like science but I don’t want to be a scientist’: understanding 10-14 year olds’ science and career aspirations

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Why study children’s science aspirations?

• Age 10-14 as ‘critical period’ for forming views of science and science aspirations
• Probabilistic/predictive function
• Education policy focus
• Sociological interest
Methodology

• 5 year, longitudinal ESRC funded project, part of TISME
• Mixed methods
• 3 tracking phases: Y6 (age 10/11); Y8 (age 12/13), Y9 (age 13/14)
• Phase 1
  • Survey of 9,319 Y6 pupils, 279 primary schools, England
  • 170 interviews (92 children, 78 parents)
• Phase 2
  • Survey of 5,634 Y8 pupils (69 secondary schools)
  • Follow-up interviews with 85 children
• Phase 3: 2012/3
  • Intervention
What do children aspire to age 10-13?

• Careers in the arts, sports, medicine and teaching are most popular. Business also popular among Year 8 pupils.
• Generally high aspirations
  – Mostly professional, managerial and technical jobs
  – 91% agree is important to make a lot of money
  – 72% say parents expect them to go to university
  – 65% of Year 6 pupils and 51% of Year 8 pupils want to be ‘famous’.
• Work-life balance and altruism:
  – 96% agree that it will be important to have time for family
  – 90% aspire to ‘help others’ in their working lives
  – 78% want a career that will ‘make a difference in the world’
Percentage of students aspiring to job (most popular coded free responses*, by age)

*Based on a sample coding of 3,247 Y6 children and 2,124 Y8 children
Science careers are not popular

% Y8 children (age 12/13) agreeing would like this job

Business  Arts/Showbiz  Sports/athlete  Doctor/medicine  Inventor  Engineer  Scientist

[Bar chart showing the percentage of Y8 children who would like different careers, with Business being the most popular and Scientist being the least.]
Most Y6 and Y8 children like science

– Science is fourth most popular subject (especially among girls)
– Over 70% of Y6 and Y8 pupils agree that they learn interesting things in science
– Around 80% of Y8 pupils agree that they have enthusiastic science teachers and that their teachers expect pupils to do well
– 19% find science ‘difficult’
Children have positive views of science careers

• 73% Y8 pupils agree that science is generally useful for their futures
• 70% feel that science is useful for getting a good future job.
• 79% believe that scientists do valuable work
• 62% agree that scientists are respected by society
• 63% think scientists make a lot of money
The ‘being / doing’ divide

Comparison of survey responses from Y6 and Y8 pupils (% strongly/agreeing)

Legend:
- Blue: Age 10/11
- Red: Age 12/13

- Learn interesting things in science
- Parents think science important
- Scientists make difference in world/do valuable work
- Do science activities outside school
- Aspire to be a scientist
Who aspires to science jobs?

• More boys:
  – 18% boys, 12% girls

• More middle-class pupils:
  – 23% of socially advantaged pupils vs. 8.8% of disadvantaged pupils.

• More South Asian/ minority ethnic pupils:
  – 23% of South Asian pupils cf. 18% of Black students and 13% of White students.
What shapes likelihood of developing science aspirations?

1. Families (science capital and family *habitus*)
2. Popular perceptions of science as ‘brainy’
3. Gender
(1) Families

• Almost half of the Y8 interview sample aspired to the same job as a family member or close family friend.
• These are most often children from middle-class backgrounds, who aspire to careers in medicine, teaching and other professions.
• Working-class students were much less likely to cite a family member’s career as the inspiration for their aspirations.

• But examples of alignment over time

  “My mum always says to me ‘You’re a really good cook’ and my grandma says to me ‘We’ve got cooking in the family’, ‘cos my grandma cooks, my mum cooks, my Nan cooks, my great grandma used to cook ... so I think it’s just like in me in a way.” (Laylany, Year 8 girl)
• Overall, strong parental encouragement for future success:
  – 95% agree important to parents that achieve well
  – 77% want child to make a lot of money
  – 72% expect child to go to university (but classed)

• Social class patterns in hobbies/activities as source of aspirations (see also Vincent & Ball ‘07)
Interaction of family *habitus* and capital

- Power of habitual practices and values ("what people like us do")
- Daily reinforcement of some career paths as more ‘natural’ or ‘thinkable’ for particular children
- Eg. Girls and nurturing professions ("They think I’d be great with children because I help my sister when she’s sad and I like play with her a lot", Celina).
Science is for us: families that make science ‘thinkable’

- Mostly middle-class families with high quality science capital
  - Science capital: science-related qualifications, knowledge, interest, literacy and contacts
- More often White and/or South Asian
- Interaction of economic, social and cultural capital with family *habitus*
- Family practices aimed at ‘growing’ interest and ‘concerted cultivation’
Making science ‘thinkable’

• Science highly visible and familiar in family life
• Opportunities, resources and support for children to develop practical mastery/ ‘feel’ for science in everyday family life
• Cultivation of perception of science as desirable
• Mutually reinforcing: part of ‘what we do’ and ‘who we are’
• Family habitus can compensate for lack of science capital (e.g. Luna/ Stella) – but how sustainable?
• Science capital and ‘science for citizenship’

The more science capital a family has, the more likely their child is to aspire to a science-related career and/or plan to study science post-16.
Science as ‘unthinkable’

• Science as peripheral to everyday lives (families with ‘benign’ or ambivalent attitudes to science)
  “They never talk about science” (Jack, Black African boy)
  “I suppose in everyday life you don’t really get that much to do with science” (Jane2, white working-class mother)
• Raw/ unrefined aspirations: Enthusiastic child who is ‘really into science’ but lacks science capital
• ‘Interested, but...’ children
  E.g. MacTavish, ‘really into’ science; Coke/Mentos type engagement; ‘no idea... Not a clue’ what family think about science.
Lack of science capital exacerbated by lack of careers education in KS3

• In the interviews, only four (out of 85) Y8 pupils said that their aspirations had been informed / inspired by school careers education resources or activities.

• Careers education: too little, too late?
Lack of science capital

• Lack of awareness of where science can lead
• Science qualifications only seen to lead to: Scientist, science teacher, doctor
• Little awareness that science qualifications are transferable and potentially useful for a wide range of careers.

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Summary: Families and science aspirations

• Some families (esp. middle-class) seem better equipped to foster and support their children to develop and sustain science aspirations.
(2) Popular views of science as ‘brainy’

• Over 80% of Y6 and Y8 see scientists as ‘brainy’
• Science careers as only for the exceptional few
• Those who see science as “interesting, but...” tend to be ‘middling’ pupils
  “She [daughter] said ‘oh, you have to be really clever [to study science], you have to be a geek’... She says ‘I’m not clever enough to be good at science’” (Sandra, mother).
• Dominant notions of ‘cleverness’ (gender, class ..)
(3) Gender and Science

• Higher percentage of Y8 girls than boys rate science as favourite subject

• But, gendered science career aspirations:
  – Y6: 20% boys, 13% girls
  – Y8: 18% boys, 12% girls
  – Cf 64% Y8 girls aspire to careers in the arts
Science careers seen as male-dominated

“Its always seen as ... geeky men” (Shelley, mother)

“Its not very girly ... its not a very sexy job, its not glamorous’ (Ella, mother).
Science and femininity

• Most Y6 girls aspire to nurturing, glamorous/’girly’ and/or ‘active’ jobs

  “Actually I don’t know what I’d like to be if I didn’t get into show business. I’d have to like figure it out ... I’m obsessed with Cheryl Cole at the moment” (Louise, Year 6 girl)
Girls who aspire to science

• Two ‘types’: ‘feminine’ and ‘bluestocking’
Girls who aspire to science

• Challenge to ‘balance’ femininity and science aspirations

  “We’re kind of the nerds” (Hannah, Y8 girl)
  “I would say there are like two types of people that are into science – either there are the really like geeky people...or there are like people who are like me who aren’t like geeky but they have a knack for it ... I play the guitar and do rowing and obviously the girly stuff that other normal girls do” (Davina, Y8 girl).

• Decline Y6-Y8 in number of ‘feminine’ science girls
Negative experiences

“I said [to my daughter] why can’t you do science? She said ‘oh no it’s a boy thing’. They had an after school science club and she said ‘I’m not going because it’s all boys’. I said well you should at least go along and see if you enjoy it. She went twice and then she stopped going because it was all boys and she had no girls to talk to” (Sandra, mother of Danielle).
Boys who aspire to science

- Two types: Cool/footballers vs. young professors:
Boys who aspire to science

• Cool/footballer scientists:
  – “No one could say I’m a geek because when they look at my size then, yeah. And being good at football really helps me, yeah. Yeah, cos otherwise if I was no good at sport then people would think I’m a geek, yeah” (Gerrard, Year 8 boy).

• Young professors:
  – “I’ve been called a geek and a goody-two-shoes quite a lot” (Victor2, Year 8 boy)
  – “I think my hair would suit the job as a mad scientist!” (Neb, Year 8 boy)
Implications

• Make STEM aspirations ‘thinkable’ for all
  – More diverse ‘non-A Level’ post-16 routes in science and maths
  – Challenge perceptions of science as only for ‘clever’ (and masculine)
  – Promote a vision of ‘science for all’

• Redistribution of science capital
  – Embed STEM careers awareness in NC science (emphasising diversity of careers from science)
  – Promote message that ‘science keeps options open’
  – Invest in, and prioritise, CPD for science teachers to embed and deliver STEM careers awareness in their teaching
  – ‘More, better, and earlier’ careers education (especially targeted for socially disadvantaged)
  – Work with families
Not Girly, not sexy, not glamorous: Primary school girls' and parents' constructions of science aspirations. (2013), *Pedagogy, Culture & Society*

‘Balancing Acts’: Elementary school girls’ negotiations of femininity, achievement and science, (2012) *Science Education*

Nerdy, Brainy and Normal: Children’s and Parents’ Constructions of Those Who Are Highly Engaged with Science (2012) *Research in Science Education*


High aspirations but low progression: The science aspirations-career paradox amongst minority ethnic students. *IJSME, 9*(2), 243-271.


Spheres of Influence: What shapes young people’s aspirations at age 12/13 and what are the implications for education policy? *(under review)*

Adolescent boys’ science aspirations: masculinity, ‘race’, capital and power *(under review)*


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