Science capital and artistic souls: how the drop-off from science starts

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Abstract

Louise Archer maintains that the school students' level of "science capital" has a crucial impact on their aspirations (Archer 2014). Science capital is an overall measure of the symbolic resources that affect how school students think about themselves and about science. Archer shows that it consists of four types of resources which children may be "equipped with" when entering adulthood. Firstly, their science literacy, in other words, everything they know about science in general. Secondly, their conviction about their own science competences, in other words, how the students perceive themselves, under the influence of grades and teachers' opinions. Thirdly, their daily and non-daily practices related to science; here the researchers are referring to visits paid to museums and science centres, participation in science clubs, following science-related news online. Fourthly and lastly, their level of science capital is affected by whom they know, in other words by their personal relations with people who are professionally engaged in science. Children who have a scientist or someone who works in research among their close family are almost twice as likely to have high aspirations in terms of their own future scientific career. It is hard to change the label "I am artistically inclined" (which generally means more or less "I'm not so good at maths" and "I find history tough") into the thought "I know how to connect the dots between facts pretty well, so I could become a decent scientist one day."

Keywords: Science capital; education; social conditioning

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Thirty years from now, we could wake up to discover that we are not in fact living any better than we are now. We could then be facing a shortage of professionals capable of resolving our problems. The forecasts are pessimistic. Researchers from Kings College London have studied the professional aspirations of British school students and the role they envision science playing in their future careers. A vast share of the nearly 20,000 school students between 10 and 14 years old who were surveyed felt that natural and physical science subjects were very interesting. A clear majority responded that truly interesting things are taught at such lessons. The same amount also said that their parents consider it important to learn such subjects. Nearly four-fifths of those surveyed agreed that scientists do very useful work. And yet despite all that, less than 15% expressed a desire to become a scientist in the future.

Louise Archer maintains that the school students' level of "science capital" has a crucial impact on their aspirations (Archer 2014). Science capital is an overall measure of the symbolic resources that affect how school students think about themselves and about science. Archer shows that it consists of four types of resources which children may be "equipped with" when entering adulthood. Firstly, their science literacy, in other words, everything they know about science in general. Secondly, their conviction about their own science competences, in other words, how the students perceive themselves, under the influence of grades and teachers' opinions. Thirdly, their daily and non-daily practices related to science; here the researchers are referring to visits paid to museums and science centres, participation in science clubs, following science-related news online. Fourthly and lastly, their level of science capital is affected by whom they know, in other words by their personal relations with people who are professionally engaged in science. Children who have a scientist or someone who works in research among their close family are almost twice as likely to have high aspirations in terms of their own future scientific career. It is hard to change the label "I am artistically inclined" (which generally means more or less "I'm not so good at maths" and "I find history tough") into the thought "I know how to connect the dots between facts pretty well, so I could become a decent scientist one day."

The Science Picnic of Polish Radio and the Copernicus Science Centre (Warsaw, Poland) is Europe's largest outdoor event aimed at promoting science. Research institutes, universities, students' clubs and cultural institutions all present their research and interests at the Science Picnic, sharing their knowledge and enthusiasm with the participants of this event. In 2015, more than 100,000 people took part in the event, held at the National Stadium in Warsaw. During the 2015 Science Picnic event in Warsaw there was carried out a survey among school-aged students. Respondents for the survey were recruited by a deliberate selection method, in view of the survey's intended scope and assumptions.

- In terms of age, the target group consisted of students receiving school education, i.e. aged 10–19; however, it was stipulated that the younger group, consisting of teenagers aged 10–16, should be dominant.
- The respondents were to be school students who had talked to a scientist/science populariser, asked them some questions, and sometimes their behaviour showed that they were deeply involved, e.g. they had observed a presentation/experiment and so on with an apparent interest, they had spent a lot of time at a particular stand, etc.

Recruitment was carried out at all the stands/tents where programs/presentations/experiments were shown. At least one person was recruited at each stand. More respondents were recruited at larger or more popular/crowded stands. This deliberate, controlled method of selection was used to maximize the sample extension, in other words it aimed to obtain responses from people of differing ages and interests.

The conviction about own science competences - how the students perceive themselves, under the influence of grades and teachers' opinions – has been limited to three options. Respondents could defined themselves as "technically-minded", "humanities-minded" and "artistically-inclined". Labelling categories aimed to uncover respondents' primary categories of self-perception. "I am artistically inclined" generally means more or less "I'm not so good at maths" and "I find history tough". 47% of those surveyed responded that they considered themselves "technically-minded," whereas 27% described themselves as "artistically inclined" and 22% as "humanities-minded."

Among the "humanities-minded" group, just one in every twenty felt that they could become a good scientist one day, whereas the rate was one in five among the "technically-minded" group. It is assumed that the family background must strongly influence students' attitude towards a scientific career. In the presented research however there is no identified correlation between parent's education level and students' perception of the possible career in science (Tab 1, Tab 2).

Tab 1.

		P15_A. I think I could become a good scientist in future						N
		I fully agree	I generally agree	I neither agree nor disagree	I generally disagree	I completely disagree	No data	
Mother's level of education	below secondary	10,3%	20,5%	25,6%	23,1%	20,5%	0,0%	39
	secondary/post-secondary education (below undergraduate)	13,9%	23,4%	29,7%	22,2%	10,1%	0,6%	158
	Higher	16,4%	29,8%	30,2%	14,5%	9,1%	0,0%	275

Tab 2.

		P15_A. I think I could become a good scientist in future						N
		I fully agree	I generally agree	I neither agree nor disagree	I generally disagree	I completely disagree	No data	
Father's level of education	below secondary	7,0%	17,5%	31,6%	26,3%	17,5%	0,0%	57
	secondary/post-secondary education (below undergraduate)	17,0%	24,5%	28,3%	18,2%	11,3%	0,6%	159
	Higher	15,4%	30,4%	28,7%	16,7%	8,8%	0,0%	240

The marked differences are statistically significant between students whose mothers' education is below secondary and with higher educated ones (Tab 3, Tab 4).

Tab 3.

		P9. How would you describe yourself:					N
		I have a humanist mind	I have a scientific mind	I am an artistic soul	some other way	no data	
Mother's level of education	below secondary	23,1%	17,9%	46,2%	12,8%	0,0%	39
	secondary/post-secondary education (below undergraduate)	21,5%	43,0%	29,1%	4,4%	1,9%	158
	Higher	21,8%	47,3%	21,8%	7,3%	1,8%	275

Tab 4.

		P9. **How would you describe yourself:**					N
		I have a humanist mind	I have a scientific mind	I am an artistic soul	some other way	no data	
Father's level of education	below secondary	26,3%	21,1%	42,1%	10,5%	0,0%	57
	secondary/post-secondary education (below undergraduate)	22,6%	45,3%	25,2%	5,7%	1,3%	159
	Higher	20,8%	47,5%	22,1%	7,1%	2,5%	240

The marked differences are statistically significant: between students whose fathers' education is below secondary and with better educated ones (Tab 5, Tab 6).

Tab 5

Mother's occupation	How would you describe yourself:					N
	I have a humanist mind	I have a scientific mind	I am an artistic soul	some other way	no data	
managers/specialists with higher education	22,6%	48,2%	17,1%	9,8%	2,4%	164
company owner/co-owner	19,6%	49,0%	25,5%	3,9%	2,0%	51
middle-level staff/technicians/office administration employees	21,3%	45,1%	29,5%	4,1%	0,0%	122
service sector workers (e.g. hairdressers, consultants, etc.	31,6%	21,1%	44,7%	0,0%	2,6%	38
blue collar workers (manual workers)	19,0%	28,6%	33,3%	14,3%	4,8%	21
Farmers/assisting family members	20,0%	20,0%	60,0%	0,0%	0,0%	5
does not work	21,9%	39,7%	31,5%	5,5%	1,4%	73
not applicable - the person is dead	33,3%	0,0%	66,7%	0,0%	0,0%	3

Tab 6.

Father's occupation	How would you describe yourself:					N
	I have a humanist mind	I have a scientific mind	I am an artistic soul	some other way	no data	
managers/specialists with higher education	17,4%	52,3%	21,9%	6,5%	1,9%	155
company owner/co-owner	22,9%	50,0%	20,0%	4,3%	2,9%	70
middle-level staff/technicians/office administration employees	27,2%	37,0%	25,9%	8,6%	1,2%	81

service sector workers (e.g. hairdressers, consultants, etc.	30,6%	30,6%	36,1%	2,8%	0,0%	36
blue collar workers (manual workers)	20,2%	39,3%	31,0%	8,3%	1,2%	84
Farmers/assisting family members	16,7%	16,7%	50,0%	8,3%	8,3%	12
does not work	27,3%	36,4%	27,3%	9,1%	0,0%	11
not applicable - the person is dead	11,1%	33,3%	55,6%	0,0%	0,0%	18

What to do with the fact that those school students who described themselves as "humanities-minded" responded four times less often than the "technically-minded" that they felt they could become a good scientist someday? The contemporary culture and egalitarian discourse might create an illusion of equal opportunities. These results however show that a few years into the future we as a society could end up having serious trouble further developing and maintaining the technologies that seem to be such an obvious element of our lives.

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