PISA IN FOCUS 18

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Are students more engaged when schools offer extracurricular activities?

- Around 90% of students in OECD countries attend schools that offer field trips to places where students can learn about scientific principles and concepts.
- In most countries, science-related extracurricular activities at school are related to better student performance, a stronger belief by students in their abilities to handle science-related tasks, and greater enjoyment of learning science. And, in many countries, this is true even after accounting for the socio-economic background of both students and schools.

Science project. The very phrase is nearly synonymous with hands-on learning, learning-by-doing, collaboration. Are students more engaged and do they perform better in science if their school encourages them to work on science projects, participate in science fairs, belong to a science-related club or go on science-related field trips – in addition to teaching them the mandatory science curriculum? To find out, PISA 2006 asked school principals about what kinds of extracurricular science activities they offered their students and linked their responses with students' performance on the PISA science test.

The types and availability of enrichment activities vary widely…

Across OECD countries, 89% of students attend schools whose principals reported that science-related field trips were commonly offered. In Australia, the Czech Republic, Estonia, Hungary, Italy, Poland, the Slovak Republic, Slovenia and the partner countries Latvia, Lithuania, Qatar, Romania, the Russian Federation and Thailand, more than 96% of students attend such a school; but in Japan, only 30% of students do. In Poland, all students attend schools that hold science competitions, according to their principals; while more than 97% of students in Australia and the partner countries Kyrgyzstan and the Russian Federation do, too. On average in OECD countries, 56% of students attend schools that hold science competitions. These kinds of competitions are not as popular in Japan, where just 6% of students attend such schools, Denmark (10% of students) and Norway (16% of students). Extracurricular science projects, science fairs and science clubs are less prevalent across OECD countries: on average, 48% of students are in schools that encourage involvement in extracurricular science projects, 42% are in schools that organise science fairs, and 41% are in schools that have science clubs.

		Percentage of students whose schools promote engagement with science using:				
		Excursions and field trips	Science competitions	Extracurricular science projects	Science fairs	Science clubs
		%				
OECD	Australia	97	98	70	31	31
	Austria	91	35	30	27	27
	Belgium	91	52	48	35	5
	Canada	95	64	64	55	48
	Chile	74	36	47	44	39
	Czech Republic	97	78	50	61	47
	Denmark	87	10	18	25	3
	Estonia	97	88	88	81	50
	Finland	94	37	23	9	9
	Germany	95	43	34	29	47
	Greece	87	67	23	9	11
	Hungary	97	84	38	69	72
	Iceland	95	25	23	7	5
	Ireland	93	54	53	64	21
	Israel	87	62	65	32	53
	Italy	96	34	75	16	39
	Japan	30	6	19	11	49
	Korea	80	86	44	49	87
	Luxembourg	93	41	56	69	33
	Mexico	75	72	54	39	21
	Netherlands	89	35	40	21	8
	New Zealand	94	91	57	72	32
	Norway	94	16	42	36	1
	Poland	99	100	51	27	78
	Portugal	94	62	86	62	64
	Slovak Republic	99	81	44	70	78
	Slovenia	97	80	79	85	92
	Spain	95	37	36	57	69
	Sweden	81	56	29	24	7
	Switzerland	95	22	29	47	35
	Turkey	78	54	48	29	39
	United Kingdom	87	72	60	35	73
	United States	92	58	65	50	73
	OECD average	89	56	48	42	41
Partners	Argentina	80	51	65	72	16
	Azerbaijan	91	79	29	42	68
	Brazil	84	39	86	82	5
	Bulgaria	86	78	52	20	a
	Chinese Taipei	89	72	71	73	76
	Colombia	87	62	75	71	93
	Croatia	90	75	58	49	21
	Hong Kong-China	90	91	83	52	91
	Indonesia	74	63	45	25	60
	Jordan	90	75	84	80	67
	Kyrgyzstan	94	98	36	75	79
	Latvia	99	91	86	6	14
	Lithuania	99	91	76	98	80
	Macao-China	69	91	96	34	46
	Montenegro	83	81	57	31	68
	Qatar	97	78	71	66	41
	Romania	100	92	55	62	71
	Russian Federation	99	98	80	83	84
	Serbia	65	84	43	41	83
	Thailand	96	93	89	97	84
	Tunisia	78	49	51	56	83
	Uruguay	83	32	60	57	33

Source: OECD, *PISA 2006 Database*.

…but their association with better student performance is consistent.

In most countries, students in schools that offer more science-related extracurricular activities tend to perform better in science than do students in schools that offer fewer such activities. This is the case in 22 of 31 OECD countries and 14 of 17 partner countries and economies with available data. The strongest relationship is found in Germany, where 15% of the variation in student performance in science can be accounted for by the availability of science-related extracurricular activities in the schools, and in Australia, where 13% of the variation in student performance can be explained in this way.

In 21 OECD countries and 12 partner countries and economies, the positive relationship between the availability of these kinds of activities at school and student performance in science holds even after accounting for students' socio-economic background. But in the United States, students in schools that offer fewer of these kinds of science-related activities tend to perform better in science, after accounting for the students' socio-economic backgrounds, while in Montenegro, the relationship is negative both before and after accounting for students' backgrounds.

Even after accounting for the average socio-economic background of both schools and students, in eight OECD countries, four partner countries and one partner economy, on average, students in schools that offer more extracurricular activities tend to perform better than those in schools that offer fewer such activities. In many countries and economies, the performance advantage of schools that offer more science-related extracurricular activities disappears after accounting for the socio-economic backgrounds of students and schools. This is because the schools that offer more of these kinds of activities also tend to be socio-economically advantaged and, in turn, tend to benefit from other features that are also related to higher scores on the PISA surveys.

The benefits are seen in students' attitudes, too.

Students in schools that offer more science-related extracurricular activities tend not only to perform better in science, but also to report more positive attitudes towards science. They believe in their own ability to handle science-related tasks effectively (known as self-efficacy) and they enjoy learning science. Self-efficacy and enjoyment are important in learning, as these have been shown to have considerable impact on the way students set goals and use learning strategies. In 22 OECD countries, 7 partner countries and 1 partner economy, students in schools that offer more of these kinds of activities tend to have higher levels of self-efficacy in science; and in 20 OECD countries, 2 partner countries and 1 partner economy, they also enjoy learning science more.

		Relationship between science-related extracurricular activities and....								
		...performance in science			...self-efficacy in science			...enjoyment of science		
		Before accounting for students' socio-economic background	After accounting for students' socio-economic background	After accounting for students' and schools' socio-economic background	Before accounting for students' socio-economic background	After accounting for students' socio-economic background	After accounting for students' and schools' socio-economic background	Before accounting for students' socio-economic background	After accounting for students' socio-economic background	After accounting for students' and schools' socio-economic background
OECD	Australia	Positive relationship	Positive relationship		Positive relationship			Positive relationship		
OECD	Austria	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
OECD	Belgium	Positive relationship	Positive relationship		Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	
OECD	Canada	Positive relationship						Positive relationship		
OECD	Chile	Positive relationship	Positive relationship		Positive relationship	Positive relationship		Positive relationship		
OECD	Czech Republic	Positive relationship	Positive relationship		Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
OECD	Denmark	Positive relationship	Positive relationship	Positive relationship						
OECD	Estonia									
OECD	Finland									
OECD	Germany	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
OECD	Greece	Positive relationship	Positive relationship	Positive relationship	Positive relationship			Positive relationship	Positive relationship	Positive relationship
OECD	Hungary	Positive relationship	Positive relationship		Positive relationship			Positive relationship	Positive relationship	Positive relationship
OECD	Ireland	Positive relationship	Positive relationship		Positive relationship			Positive relationship		
OECD	Israel									
OECD	Italy	Positive relationship	Positive relationship		Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
OECD	Japan	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
OECD	Korea	Positive relationship	Positive relationship		Positive relationship	Positive relationship		Positive relationship	Positive relationship	
OECD	Luxembourg	Positive relationship	Positive relationship		Positive relationship	Positive relationship		Positive relationship		
OECD	Mexico	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship			
OECD	Netherlands	Positive relationship	Positive relationship		Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	
OECD	New Zealand									
OECD	Norway									
OECD	Poland	Positive relationship	Positive relationship		Positive relationship					
OECD	Portugal	Positive relationship	Positive relationship	Positive relationship		Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
OECD	Slovak Republic	Positive relationship	Positive relationship		Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
OECD	Spain				Positive relationship	Positive relationship	Positive relationship	Positive relationship		
OECD	Sweden				Positive relationship	Positive relationship	Positive relationship			
OECD	Switzerland	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
OECD	Turkey	Positive relationship	Positive relationship		Positive relationship			Positive relationship		
OECD	United Kingdom				Positive relationship					
OECD	United States		Negative relationship	Negative relationship						
Partners	Argentina									
Partners	Azerbaijan	Positive relationship	Positive relationship	Positive relationship	Positive relationship					
Partners	Brazil	Positive relationship	Positive relationship							
Partners	Bulgaria	Positive relationship	Positive relationship		Positive relationship	Positive relationship		Positive relationship		
Partners	Colombia	Positive relationship			Positive relationship					
Partners	Croatia	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
Partners	Hong Kong-China									
Partners	Indonesia	Positive relationship	Positive relationship	Positive relationship	Positive relationship					
Partners	Jordan	Positive relationship	Positive relationship							
Partners	Kyrgyzstan	Positive relationship	Positive relationship							
Partners	Macao-China	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship	Positive relationship
Partners	Montenegro	Negative relationship	Negative relationship	Negative relationship						
Partners	Qatar	Positive relationship		Negative relationship	Positive relationship					Positive relationship
Partners	Romania	Positive relationship	Positive relationship							
Partners	Serbia	Positive relationship	Positive relationship		Positive relationship	Positive relationship				
Partners	Tunisia	Positive relationship	Positive relationship	Positive relationship						
Partners	Uruguay	Positive relationship	Positive relationship							

Positive relationship Negative relationship

Source: OECD, *PISA 2006 Database*.

Note: Analyses examining the association between science-related extracurricular activities and performance in science, science self-efficacy and enjoyment of science were developed using a composite index of school activities to promote the learning of science.
See OECD, *PISA 2006: Science Competencies for Tomorrow's World, Volume II: Data*, Table 5.18

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After accounting for the socio-economic backgrounds of students and schools, the positive relationship with self-efficacy holds in 13 OECD countries, 1 partner country and 1 partner economy, and the positive relationship with enjoyment of learning holds in 10 OECD countries, 1 partner country and 2 partner economies. In no country or economy is there a negative relationship between science-related extracurricular activities and positive attitudes towards learning science.

To determine a student's level of **self-efficacy** in science, PISA asked students about their ability to: *i)* recognise the science question that underlies a newspaper report on a health issue; *ii)* explain why earthquakes occur more frequently in some areas than in others; *iii)* describe the role of antibiotics in the treatment of disease; *iv)* identify the science question associated with the disposal of garbage; *v)* predict how changes to an environment will affect the survival of certain species; *vi)* interpret the scientific information provided on the labels of food items; *vii)* discuss how new evidence can lead to a change of understanding about the possibility of life on Mars; and *viii)* identify the better of two explanations for the formation of acid rain. Students were asked to choose one of the following responses: "I could do this easily"; "I could do this with a bit of effort"; "I would struggle to do this on my own"; or "I couldn't do this".

To determine a student's **enjoyment of science**, PISA asked students to indicate their level of agreement with the following statements: *i)* I generally have fun when I am learning science topics; *ii)* I like reading about science; *iii)* I am happy doing science problems; *iv)* I enjoy acquiring new knowledge in science; and *v)* I am interested in learning about science. Students were asked to choose one of the following responses: "strongly agree"; "agree"; "disagree"; or "strongly disagree".

The bottom line: PISA cannot determine whether being exposed to science-related extracurricular activities enhances students' attitudes towards science or whether students with more positive attitudes towards science are attracted to schools that offer more of such activities; both could be true. But what PISA does show is that these kinds of activities have a positive relationship not only to student performance, but also to students' attitudes towards learning and their belief in their own abilities.

For more information

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See *PISA 2006: Science Competencies for Tomorrow's World, Volume I: Analysis*, OECD Publishing; *PISA 2006: Science Competencies for Tomorrow's World, Volume II: Data*, OECD Publishing.

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