Investigating Knowledge and Sources of Scientific Information of University Students and Lifelong Learners

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25 Year Study of Undergraduates

- In class survey of over 12,000 students from 189-2015
- Mostly freshman and sophomore students with minimal college science experience
- Average science knowledge scores of 75% consistently
- STEM majors do better
- Very little change is answers over 25 years

Students' Beliefs and Knowledge

Factors	Agree ≥ 4 (across factor)	Disagree 2 ≤ (across factor)
Belief in UFOs or Aliens	Mean = 11.33 (2.27) n = 1519	Mean = 11.11 (2.36) n = 701
Faith-based Beliefs	Mean = 10.84 (2.30) n = 1156	Mean = 11.89 (2.22) n = 762
Unscientific Beliefs	Mean = 10.92 (2.32) n = 1301	Mean = 11.62 (2.32) n = 1330

Students beliefs and attitudes on scientific issues were not highly correlated with science knowledge. Pseudoscience beliefs are not at odds with functional scientific literacy.

Findings

- Demographic variables accounted for 8% of the variance in students' science knowledge scores.
- F (4, 9692) = 208.75, $p < .01$, $R^2_{adj} = 0.08$
  - Strongest single predictor was how many science courses they had completed, yet this only accounted for 3% of the variance in students' science literacy scores.
- Students' beliefs and attitudes towards science and technology were related moderately to their science literacy scores and accounted for 40% of the variance in their science literacy scores (R^2_{adj}= .039).

Study about Sources of Knowledge

- 669 undergraduate students at the University of Arizona
- Enrolled in a non-majors astronomy course between 2013 – 2015
- 48% female, 52% male
- 89% were traditional college aged students (18 – 22 years old)
- Over 75% either freshman or sophomore students

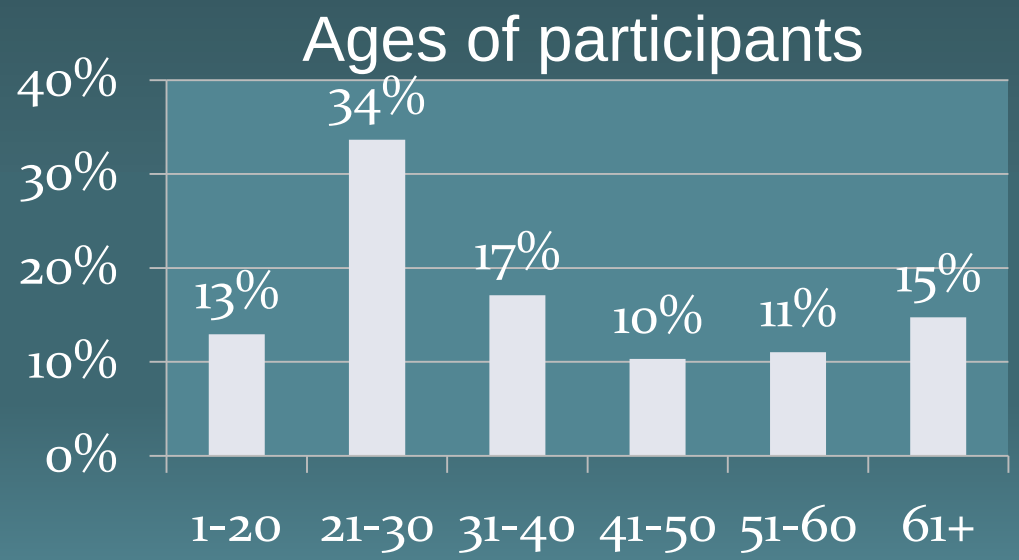
Study about Sources of Knowledge

- 35% business majors, 21% humanities majors, 15% STEM majors (engineering, science and pre med), 15% arts majors and 5% education majors
- 40% had taken two or fewer science courses

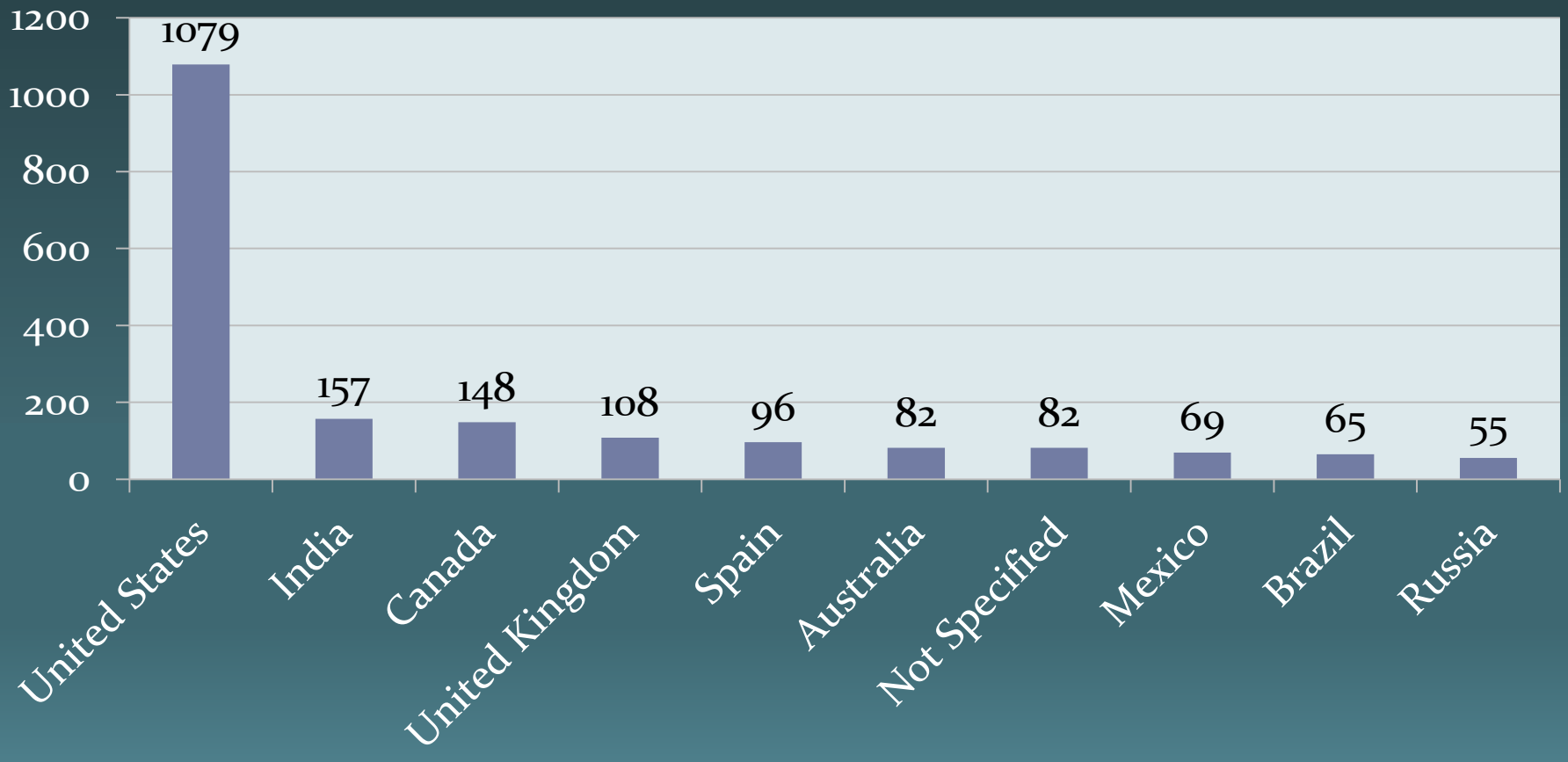
# of college science courses completed	Percent of sample (n)
0-1	20% (71)
2	22% (88)
3	25% (101)
4	9% (36)
5	6% (25)
6 or more	17% (69)

MOOC Learners

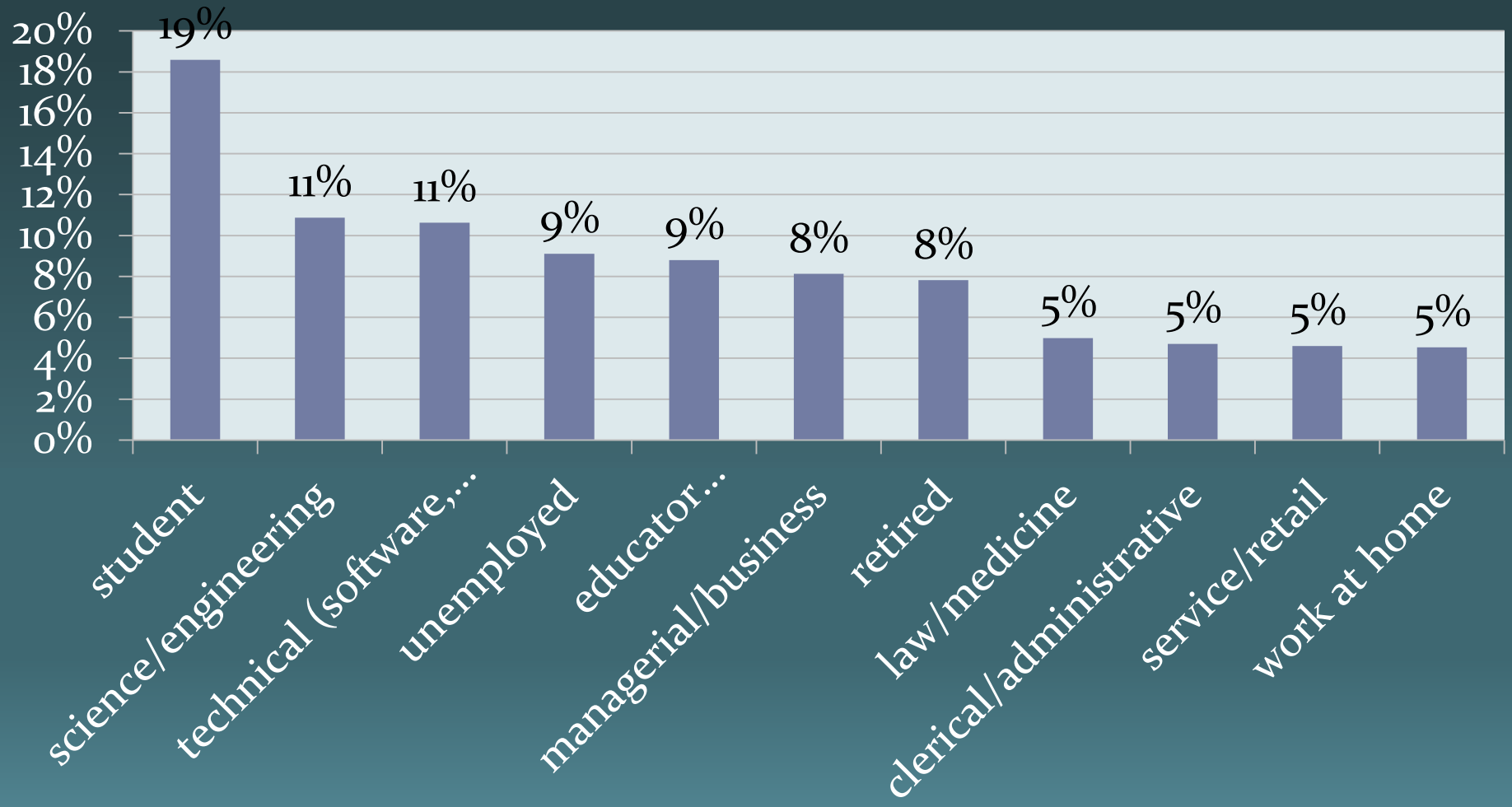
- 2889 learners in an online astronomy course offered through Coursera (taught by faculty member at Univ of Arizona)
- 42% female, 58% male



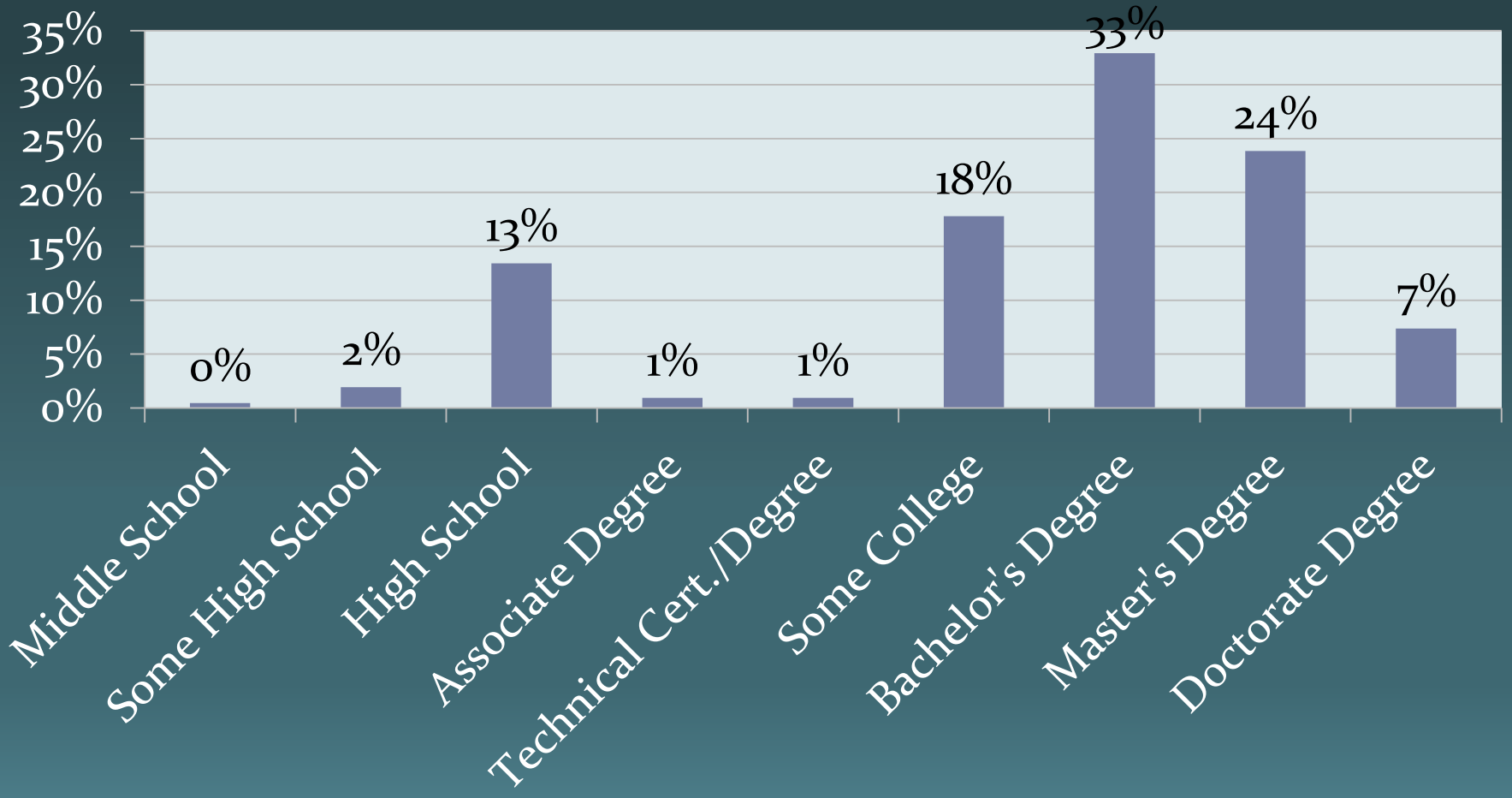
Survey participants from 112 countries



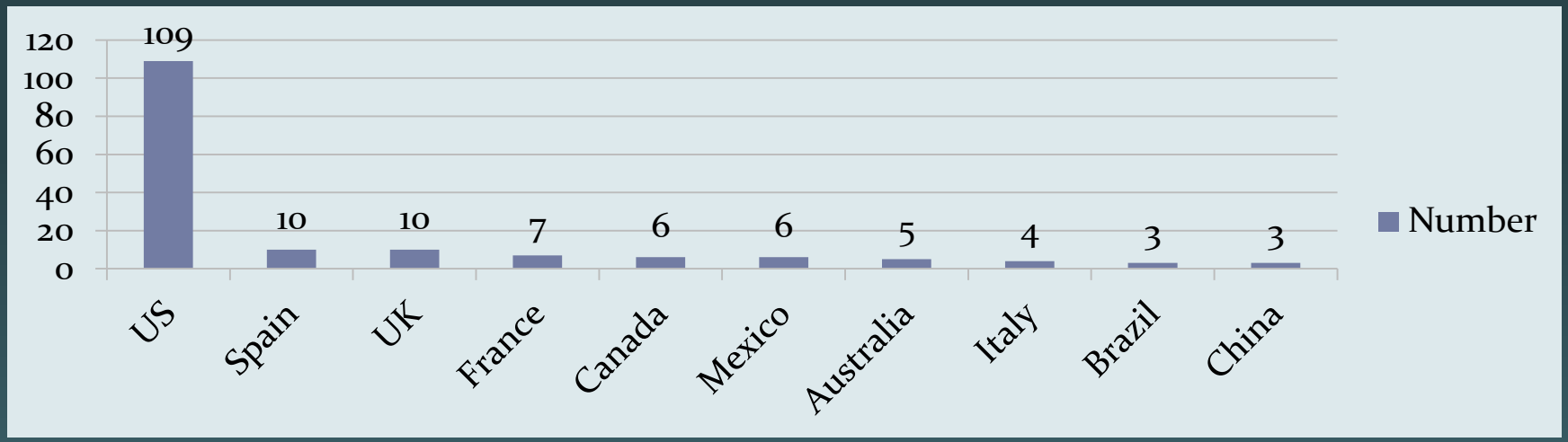
Variety of Careers

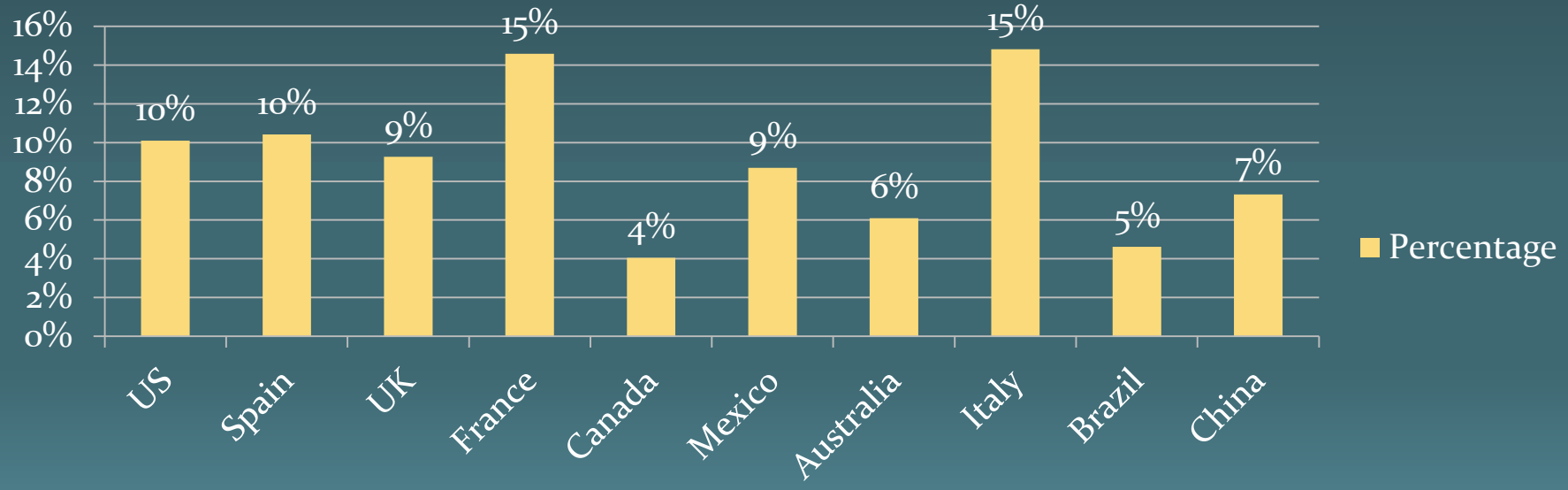


Education Background

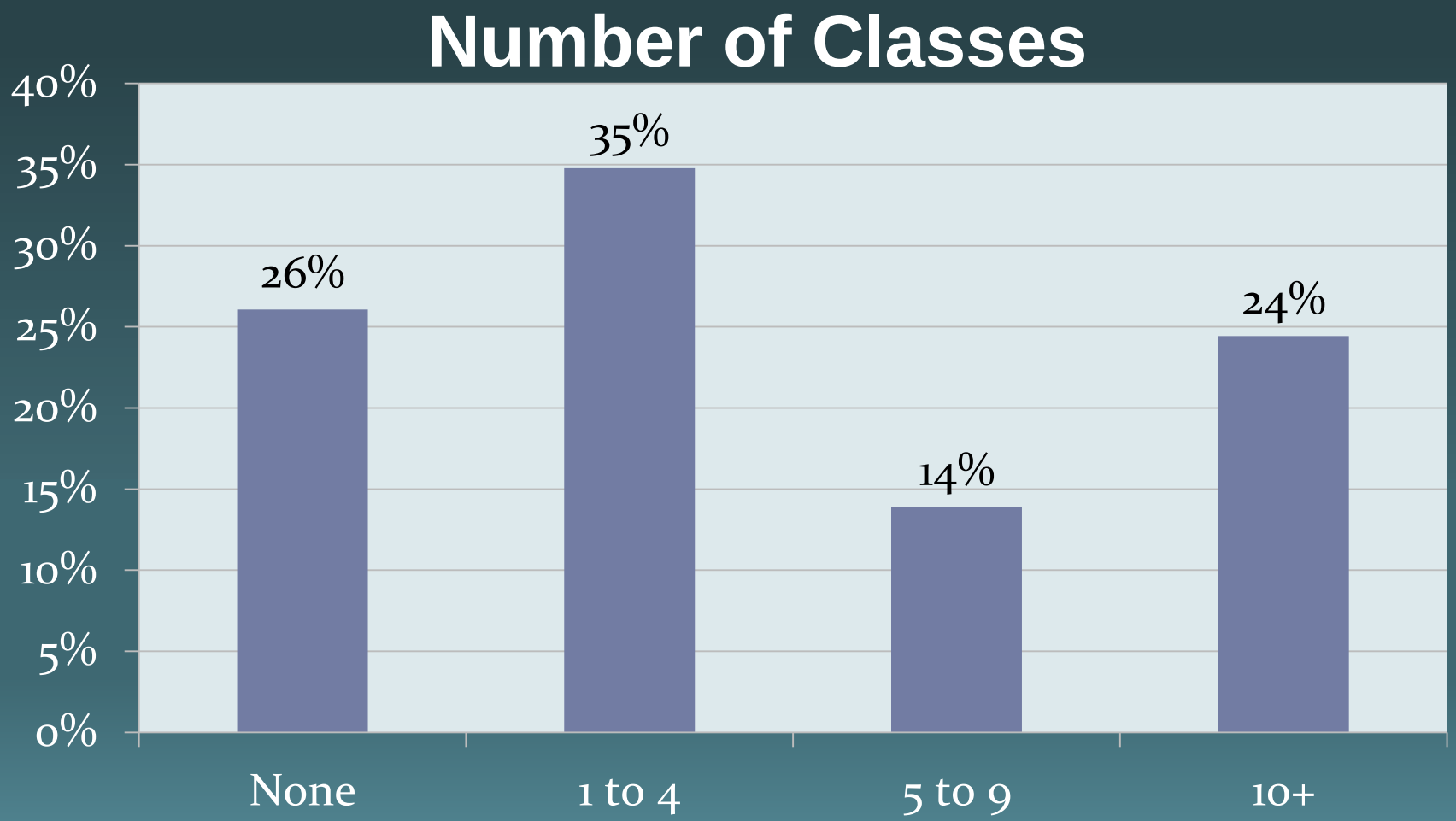


Individuals with doctorates from 39 countries





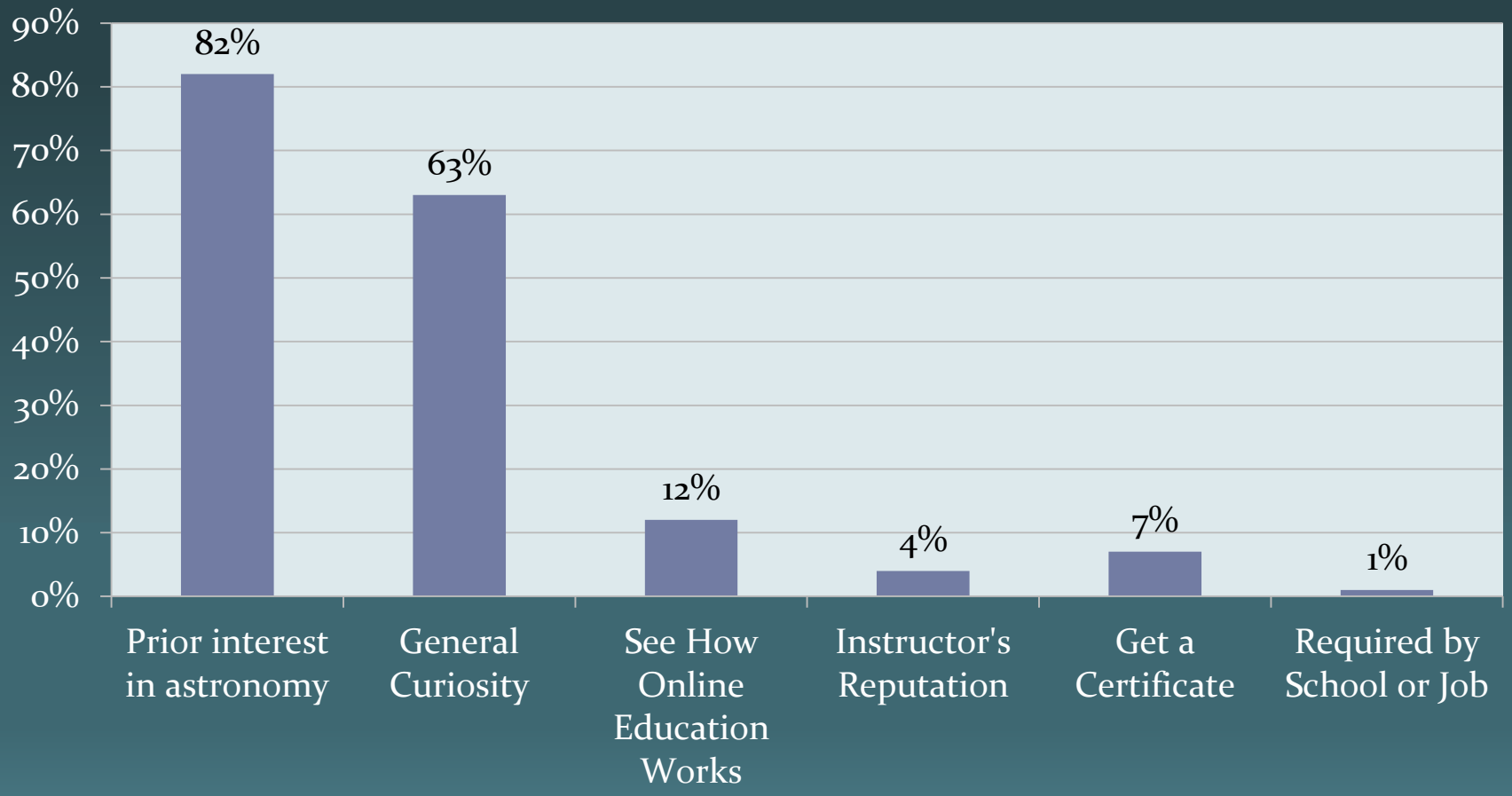
Prior College Science Experience



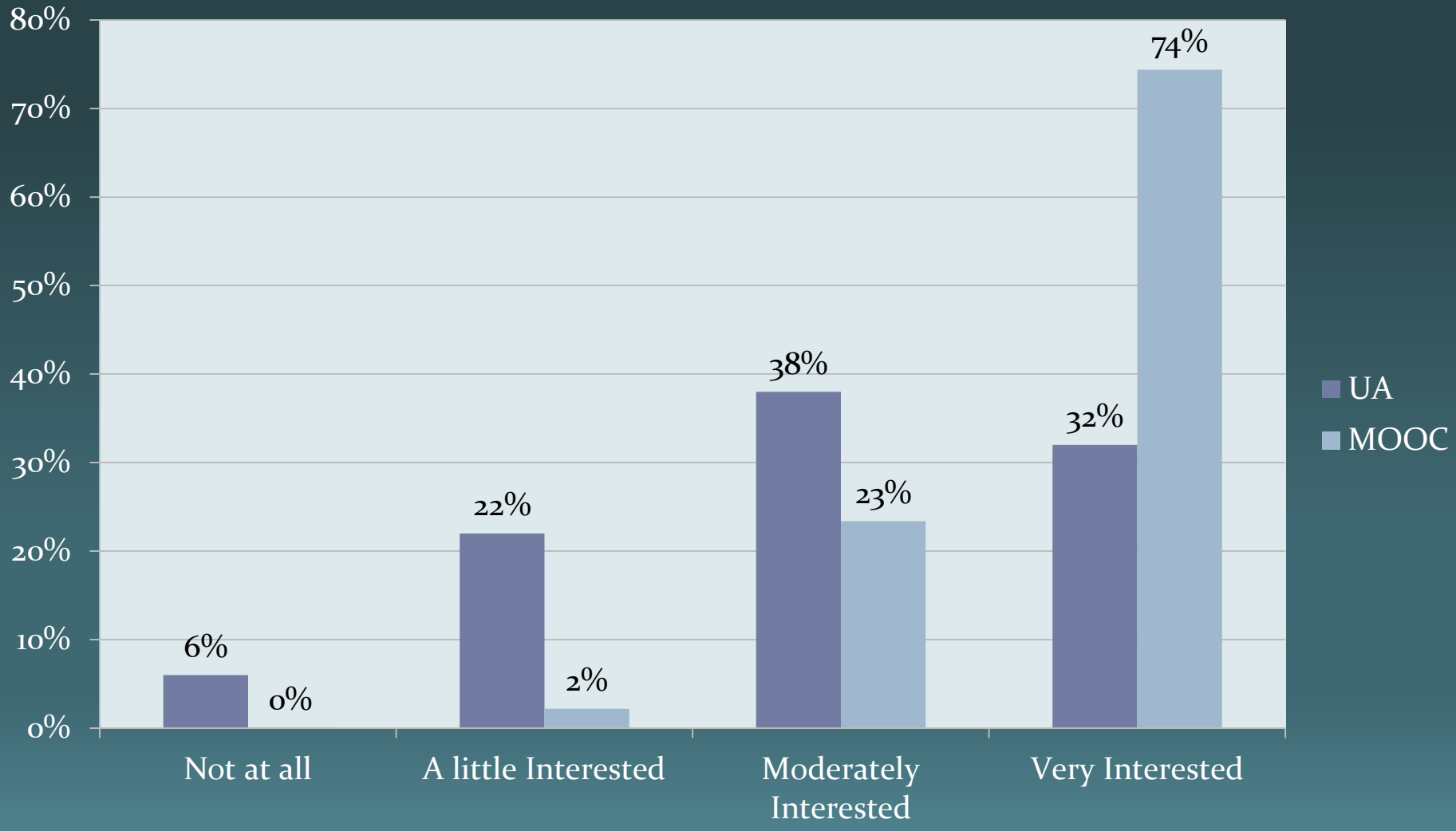
MOOC respondents demonstrate more basic science knowledge

- Undergraduate students' average on science knowledge is 75%
- MOOC students' average on science knowledge is 88%
  - More accurate and descriptive answers to the prompt, "what does it mean to study something scientifically?"

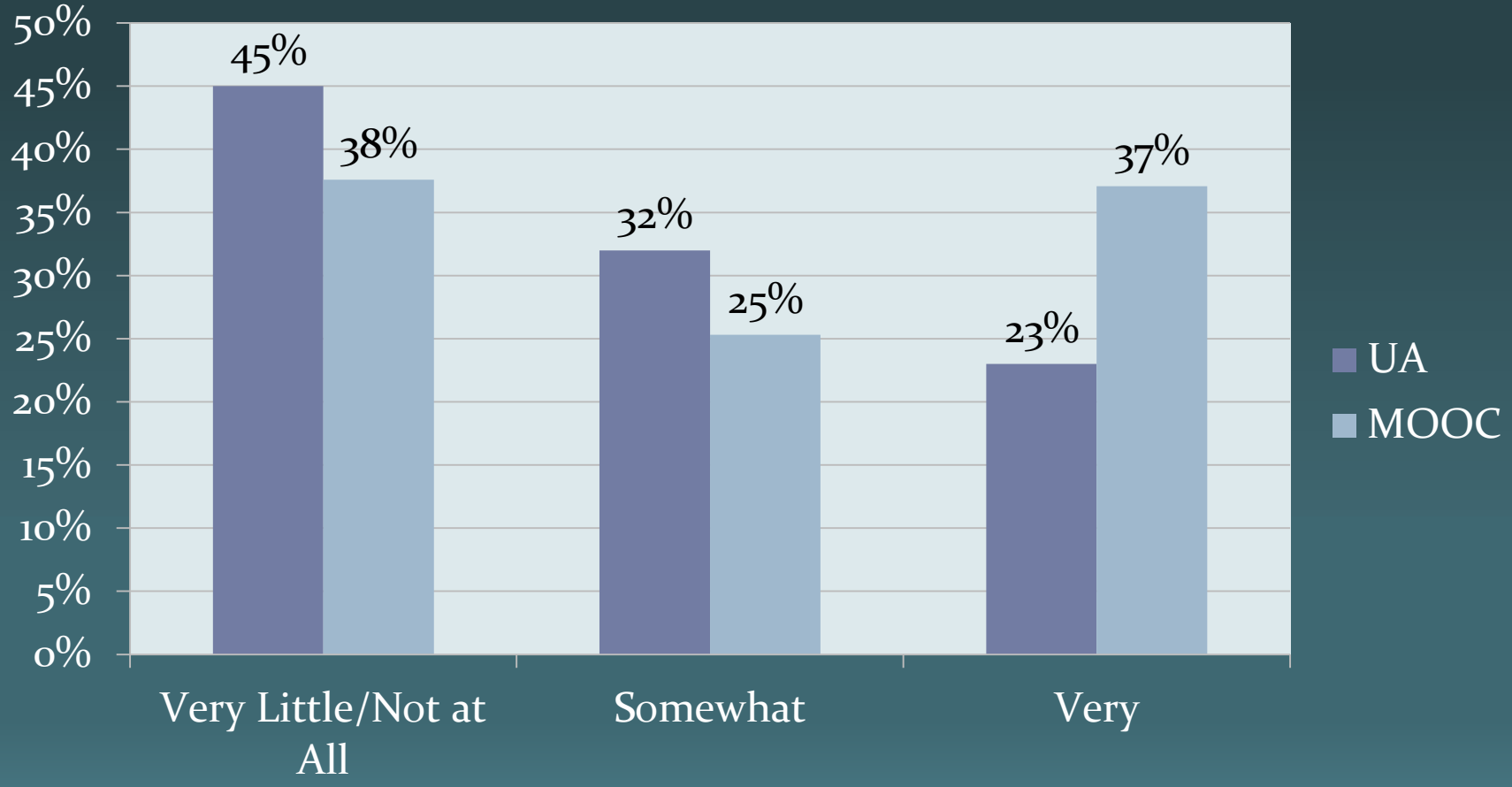
Motivations to take the course



Overall Interest in Science

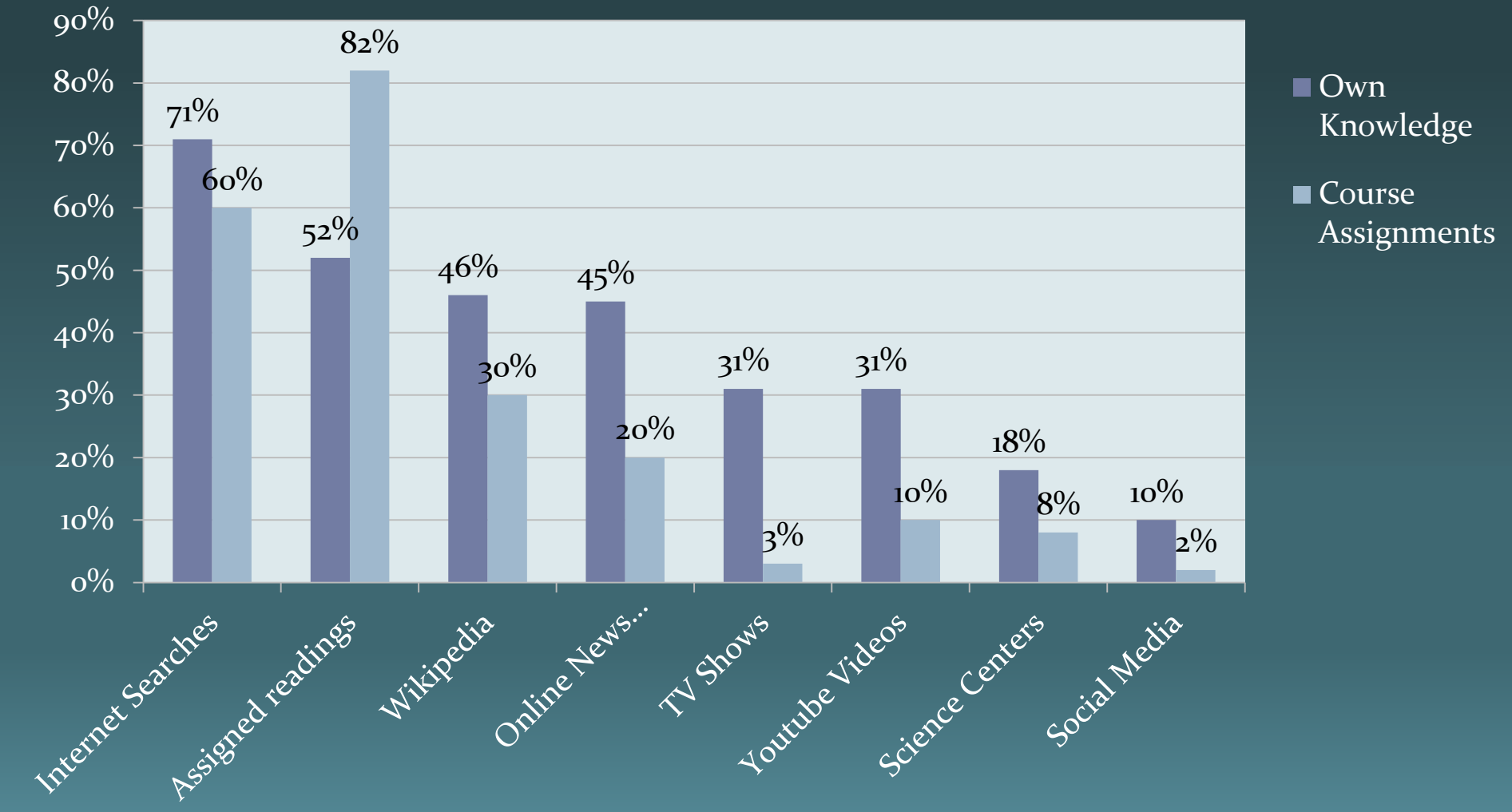


Importance of Science to Career

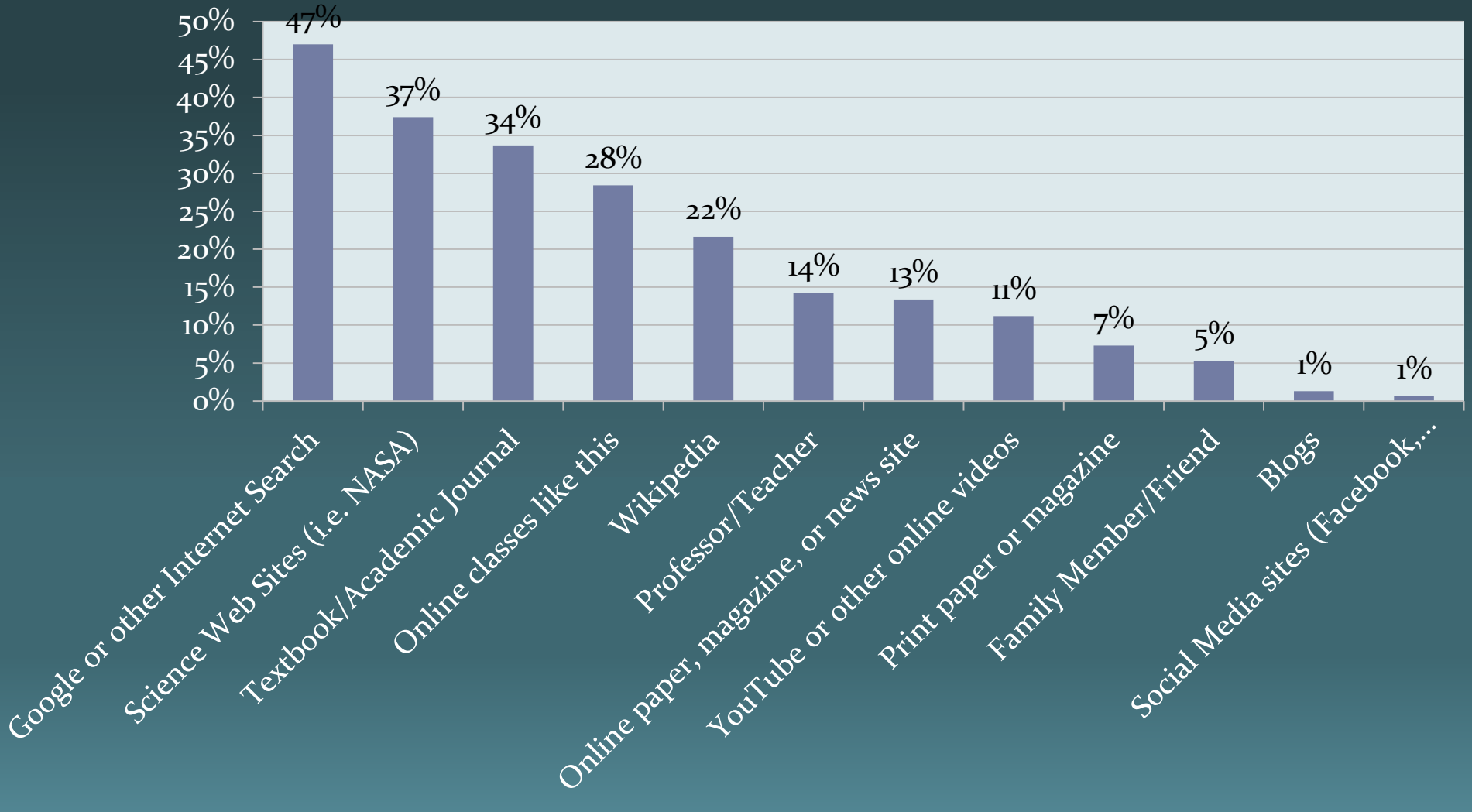


Students Reported Future Careers	% of respondents who indicated that science is very important to their future career	% of respondents who indicated that science is not at all important to their future career
Undecided (n=156)	16%	46%
STEM (n=89)	85%	3%
Business (n=140)	10%	59%
Service (n=54)	4%	76%
Public Service (n=81)	17%	37%
Teachers (n=45)	22%	29%

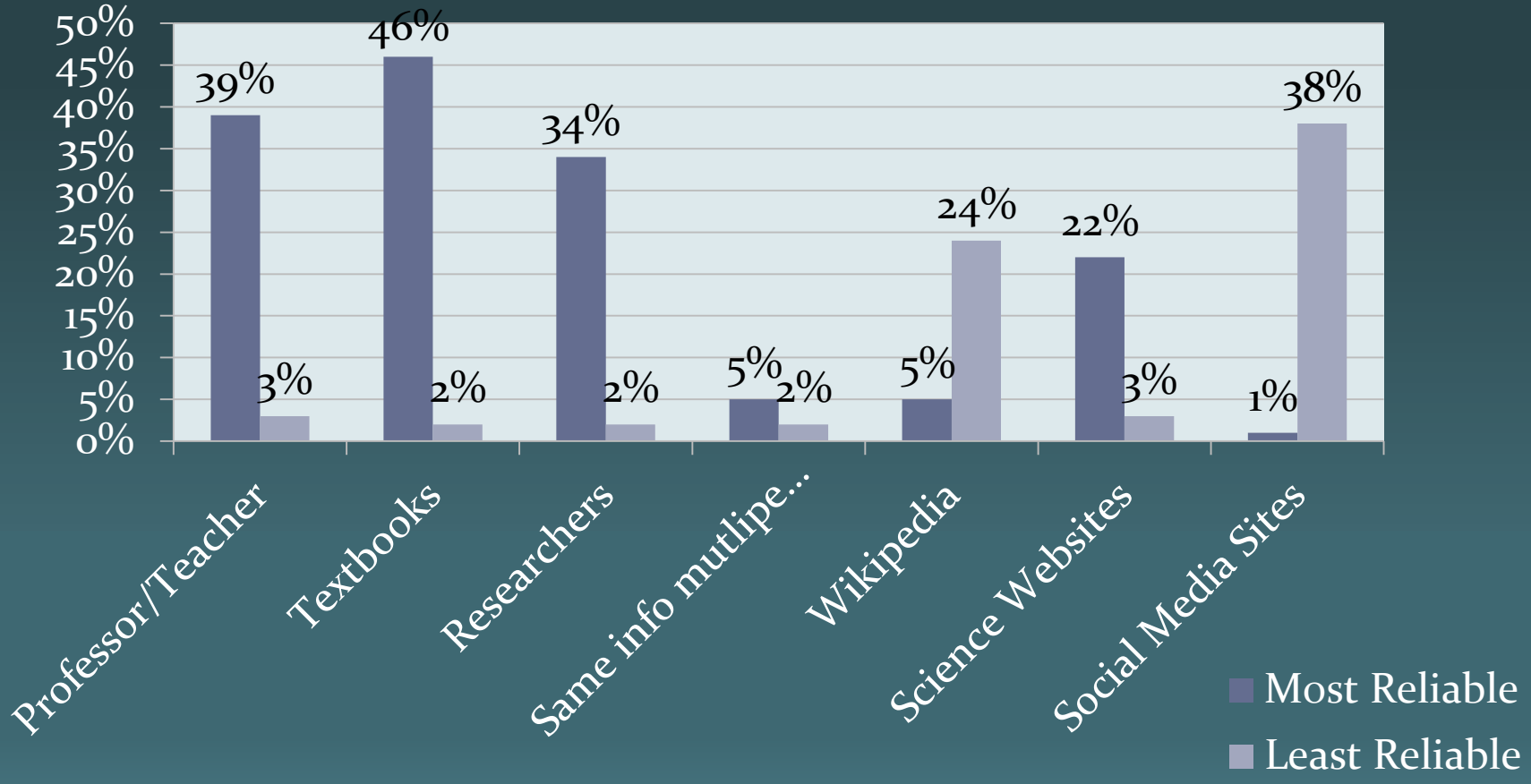
Where students look for information about science



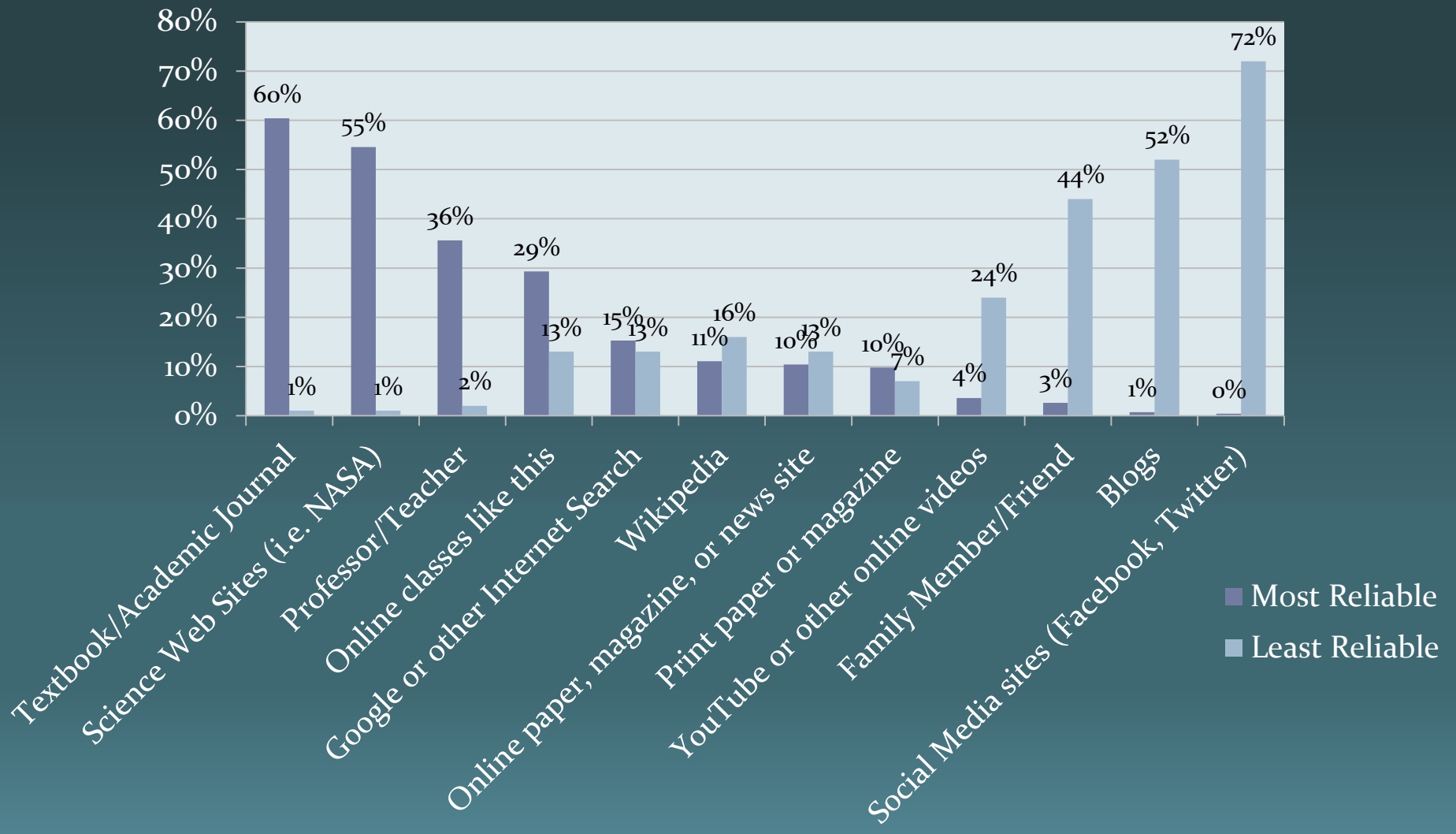
Where MOOC learners look for information about science



Undergraduate Students' Judgement of the Reliability of Information



MOOC Learners' Judgement of the Reliability of Information



What does it mean to study something scientifically?

Quality code/ sources	0	1	2	3	4
Professors/ textbooks	20%	37%	38%	5%	1%
Online science sites	11%	42%	37%	11%	0%
Online searches	37%	48%	16%	0%	0%

- 76% of the responses coded as a "3" were given by students who reported professors/textbooks as the most reliable sources of information

Implications

- As instructors, we want to understand where students get information about science.
- Same course for two different populations.
- Continued importance of information literacy

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