

FIELD-SPECIFIC ABILITY BELIEFS CAN EXPLAIN FEMALE UNDERREPRESENTATION

Beate Curdes, Hochschule Bochum

Virtual Research Training Group Autumn Workshop
October 2020

Gender imbalance and field-specific ability beliefs

Is gender imbalance in STEM* subjects a consequence of field-specific ability beliefs?

*science, technology, engineering, mathematics

Based on:

Expectations of brilliance underlie gender distributions across academic disciplines

By: Sarah-Jane Leslie, Andrei Cimpian, Meredith Meyer and Edward Freeland

Science 347, 262 (2015), DOI: 10.1126/science.1261375

<http://science.sciencemag.org/content/347/6219/262>

Leslie et al.: The field-specific ability beliefs hypothesis

“STEM disciplines vary in their female representation. Recently, women have earned approximately half of all Ph.D.’s in molecular biology and neuroscience in the United States, but fewer than 20% of all Ph.D.’s in physics and computer science.”

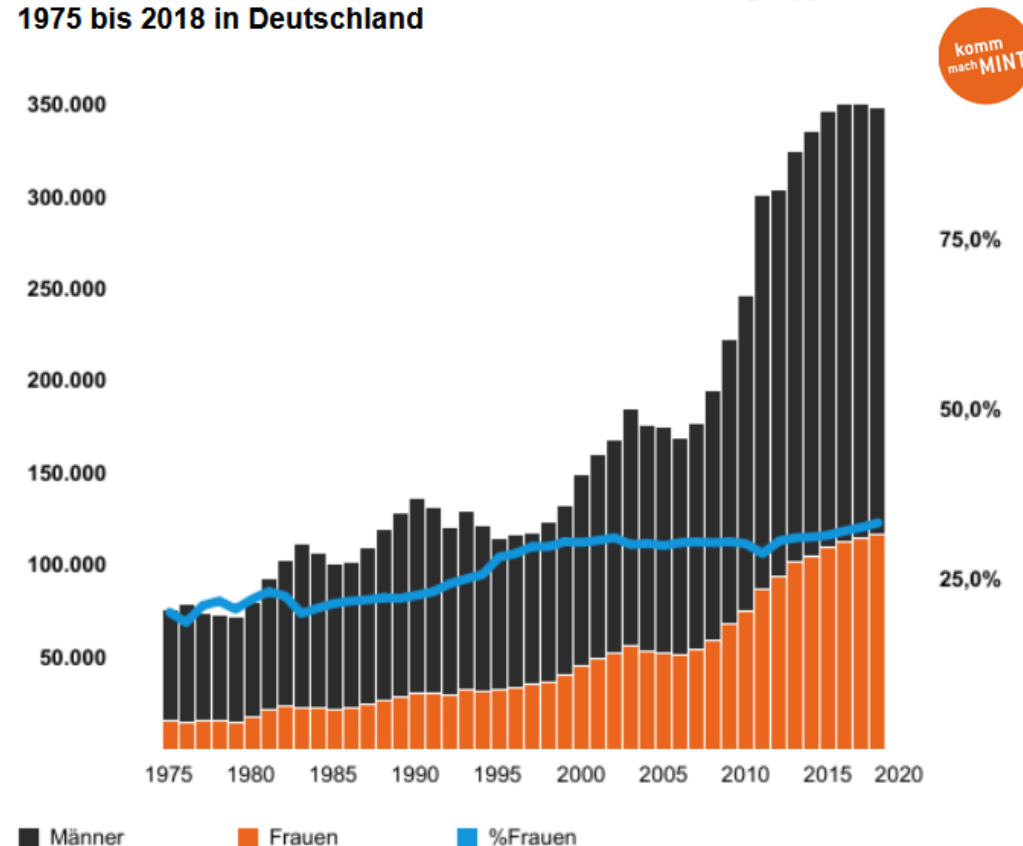
„The social sciences and humanities (SocSci/Hum) exhibit similar variability. Women are currently earning more than 70% of all Ph.D.’s in art history and psychology, but fewer than 35% of all Ph.D.’s in economics and philosophy.“

Expectations of brilliance underlie gender distributions across academic disciplines

Leslie et al, Science 347, 262 (2015), DOI: 10.1126/science.1261375

Gender imbalance in STEM subjects in Germany

Studierende im 1. Fachsemester in den MINT-Fächergruppen zusammen
1975 bis 2018 in Deutschland



Quelle: Statistisches Bundesamt (destatis) 2019 und eigene Berechnungen
© 2020 | Kompetenzzentrum Technik-Diversity-Chancengleichheit e. V.



Number of students in the 1 st semester in STEM subjects in Germany (1975 – 2018)

Female representation has been stable around 30% for 20 years.

Female representations vary (2018)

- Mathematics, chemistry: 50%
- Physics, astronomy: 35%
- Electrical engineering: <20%

<https://www.komm-mach-mint.de/service/mint-datentool>

Field-specific ability beliefs

What is your experience?

Do people in your specific academic field believe that raw, innate talent is an important requirement for success?

- A. A lot of people think so.
- B. There are people who think so, but it is not the majority.
- C. Only a few people think so.

Please look at <https://pingo.coactum.de> → 654926 or



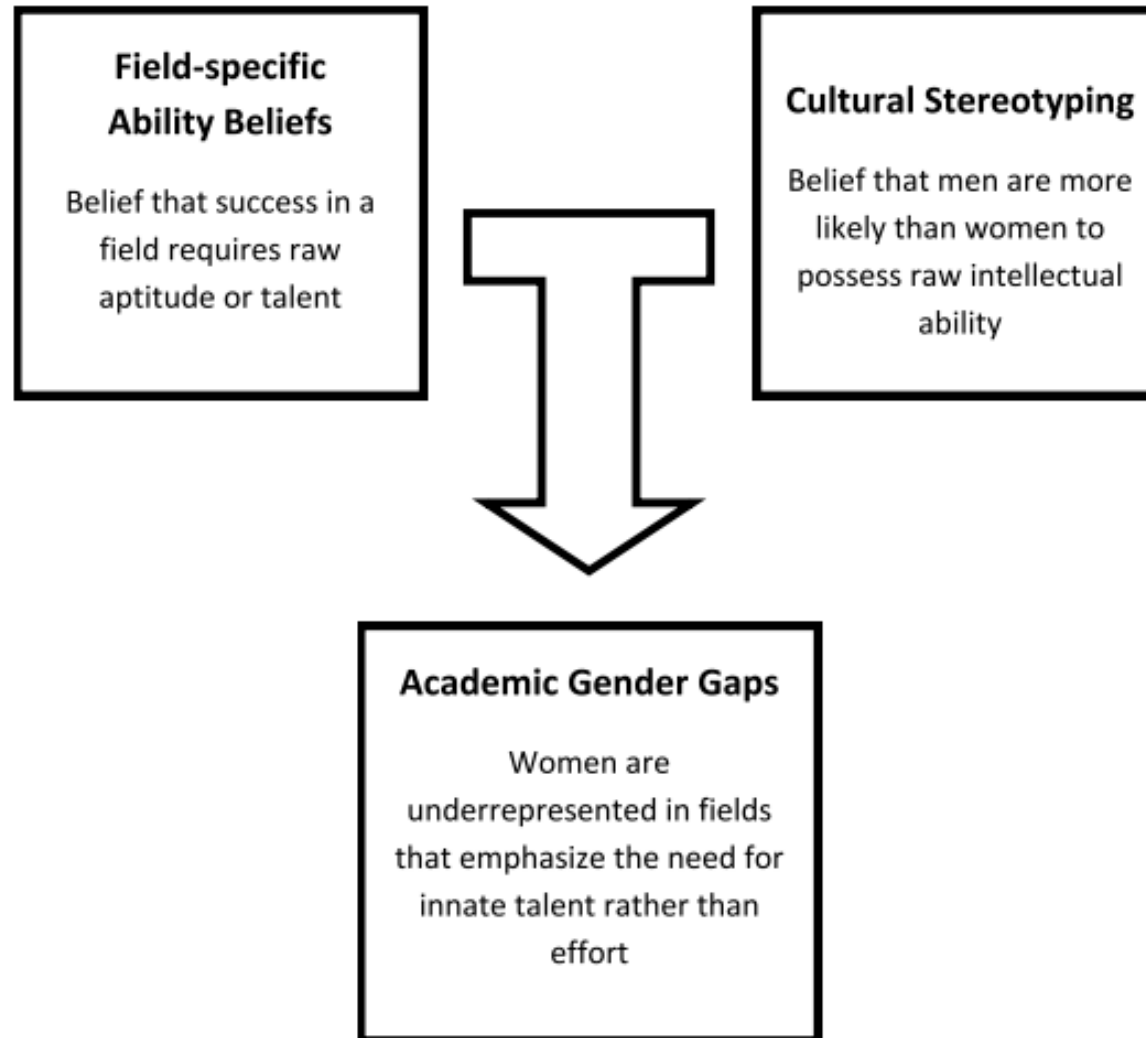
Field-specific ability beliefs

What is your experience?

What is the percentage of women in your academic field?

- A. < 20%
- B. 20% to 40%
- C. > 40%

Leslie et al.: The field-specific ability beliefs hypothesis



Expectations of brilliance underlie gender distributions across academic disciplines,
Sarah-Jane Leslie, Andrei Cimpian, Meredith Meyer and Edward Freeland
Supplementary Materials

Leslie et al.: The field-specific ability beliefs hypothesis

„We hypothesize that, across the academic spectrum, women are underrepresented in fields whose practitioners believe that raw, innate talent is the main requirement for success, because women are stereotyped as not possessing such talent.“

„This hypothesis extends to African Americans' underrepresentation as well, as this group is subject to similar stereotypes.“

Expectations of brilliance underlie gender distributions across academic disciplines

Leslie et al, Science 347, 262 (2015), DOI: 10.1126/science.1261375

Stereotype - Definition

In social psychology, a **stereotype** is an over-generalized belief about a particular category of people. It is an expectation that people might have about every person of a particular group. The type of expectation can vary; it can be, for example, an expectation about the group's personality, preferences, or ability.

While such generalizations about groups of people may be useful when making quick decisions, they may be erroneous when applied to particular individuals and are among the reasons for prejudice attitudes.

wikipedia

Stereotypes influence performance

Stereotypes can be associated with identity and influence performance in a domain.

In a study Asian-American women were subtly reminded (with a questionnaire) of either their Asian identity or their female identity prior to taking a difficult math test.

Results showed that women reminded of their 'Asianness' performed better than the control group and women reminded of their female identity performed worse than the control group.

Stereotype Susceptibility: Identity Salience and Shifts in Quantitative Performance
Margaret Shih, Todd L. Pittinsky, Nalini Ambady, Psychological Science, 1999

Leslie et al.: The field-specific ability beliefs hypothesis

Examples from the questionnaire:

*“To assess field-specific ability beliefs, we asked participants to rate their agreement with four statements concerning what is required for success in their field (e.g., “**Being a top scholar of [discipline] requires a special aptitude that just can’t be taught**”). Respondents rated both the extent to which they personally agreed with these statements, and the extent to which they believed other people in their field would agree with the statements.”*

*“There are many potential mechanisms by which field-specific ability beliefs may influence women’s representation. To assess some possibilities, we asked participants to evaluate the statement, “**Even though it’s not politically correct to say it, men are often more suited than women to do high-level work in [discipline].**””*

Expectations of brilliance underlie gender distributions across academic disciplines

Leslie et al, Science 347, 262 (2015), DOI: 10.1126/science.1261375

Leslie et al.: The field-specific ability beliefs hypothesis

Results:

- ➔ Disciplines that emphasized innate talent were more likely to endorse the idea that women are less suited for high-level scholarly work.
- ➔ Disciplines that valued giftedness over dedication rated themselves as less welcoming to women and fields that viewed themselves as less welcoming had fewer female Ph.D.'s.

Leslie et al.: The field-specific ability beliefs hypothesis

They used a large, nationwide study (faculty, postdoctoral fellows and graduate students, N=1820) of academics from 30 disciplines to evaluate their hypothesis along with three competing hypotheses:

- Possible gender differences in willingness or ability to work long hours: The more demanding a discipline in terms of work hours, the fewer the women.
- Possible gender differences at the high end of the aptitude distribution: The more selective a discipline, the fewer the women.
- Possible differences among fields in the extent to which they require systemizing or empathizing: The more a discipline prioritizes systemizing over empathizing, the fewer the women.

Leslie et al.: The field-specific ability beliefs hypothesis

- Possible gender differences in willingness or ability to work long hours: The more demanding a discipline in terms of work hours, the fewer the women

“To assess work demands, we asked participants to report the number of hours they worked per week, on-campus and off-campus. There was no correlation between the total number of hours worked (on- plus off-campus) and female representation.”

Expectations of brilliance underlie gender distributions across academic disciplines

Leslie et al, Science 347, 262 (2015), DOI: 10.1126/science.1261375

Leslie et al.: The field-specific ability beliefs hypothesis

- Possible gender differences at the high end of the aptitude distribution: The more selective a discipline, the fewer the women.

“To assess selectivity, we asked faculty participants to estimate the percentage of graduate applicants admitted each year to their department. We then reverse-coded this measure so that higher values indicate more selectivity. Fields that were more selective tended to have higher, rather than lower, female representation, but this correlation did not reach significance.”

Expectations of brilliance underlie gender distributions across academic disciplines

Leslie et al, Science 347, 262 (2015), DOI: 10.1126/science.1261375

In Germany fields with high selectivity in the beginning of the academic education have high female representation, e.g. medicine, pharmacy or psychology.

Leslie et al.: The field-specific ability beliefs hypothesis

- Possible differences among fields in the extent to which they require systemizing or empathizing: The more a discipline prioritizes systemizing over empathizing, the fewer the women.

“A composite systemizing-minus-empathizing score was significantly correlated with female representation across all disciplines, but this score did not significantly predict female representation in STEM alone or in SocSci/Hum alone.”

Expectations of brilliance underlie gender distributions across academic disciplines

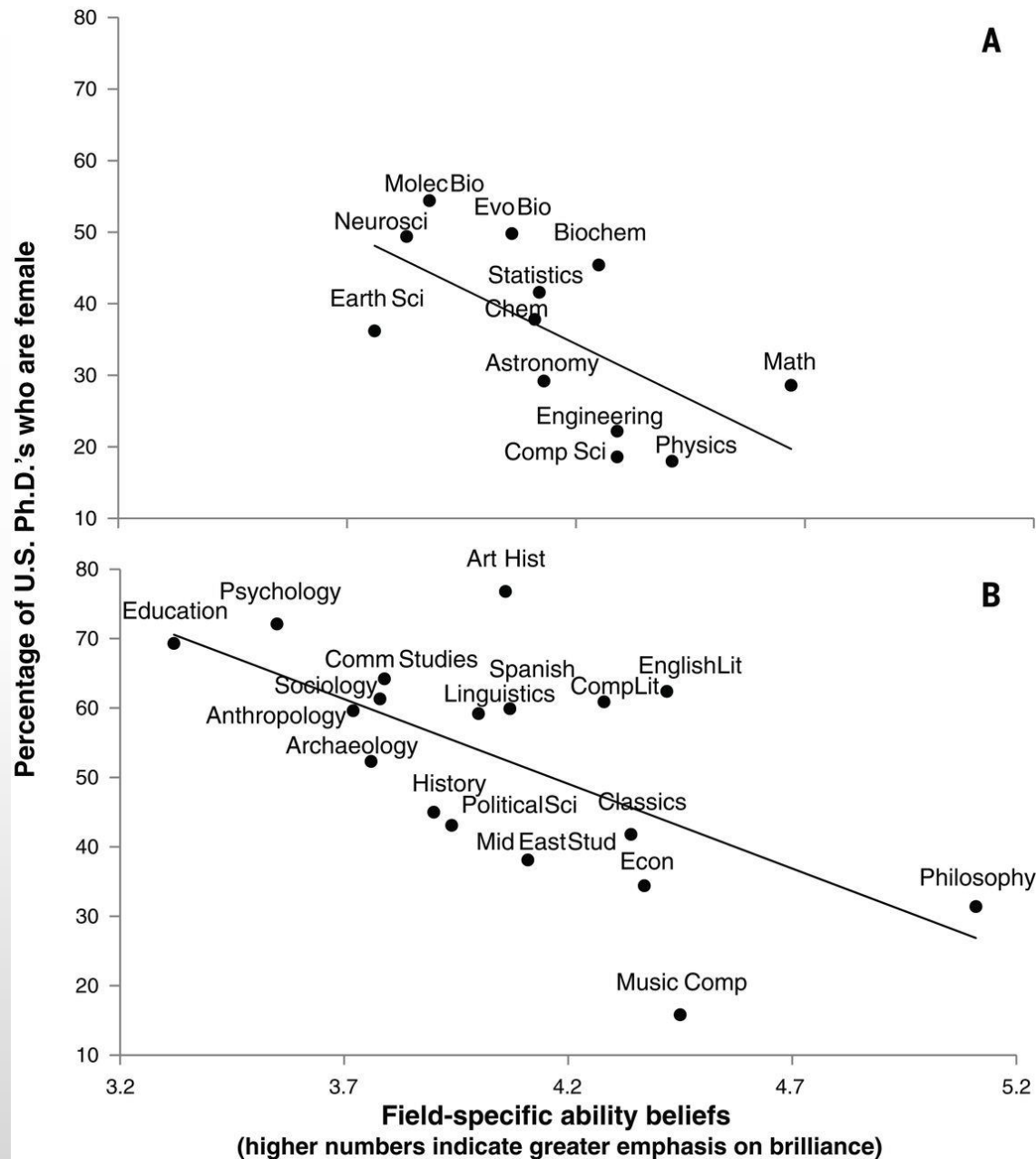
Leslie et al, Science 347, 262 (2015), DOI: 10.1126/science.1261375

Leslie et al.: The field-specific ability beliefs hypothesis

“Indeed, field-specific ability beliefs were the sole significant predictor of female representation in this final model.”

Expectations of brilliance underlie gender distributions across academic disciplines

Leslie et al, Science 347, 262 (2015), DOI: 10.1126/science.1261375



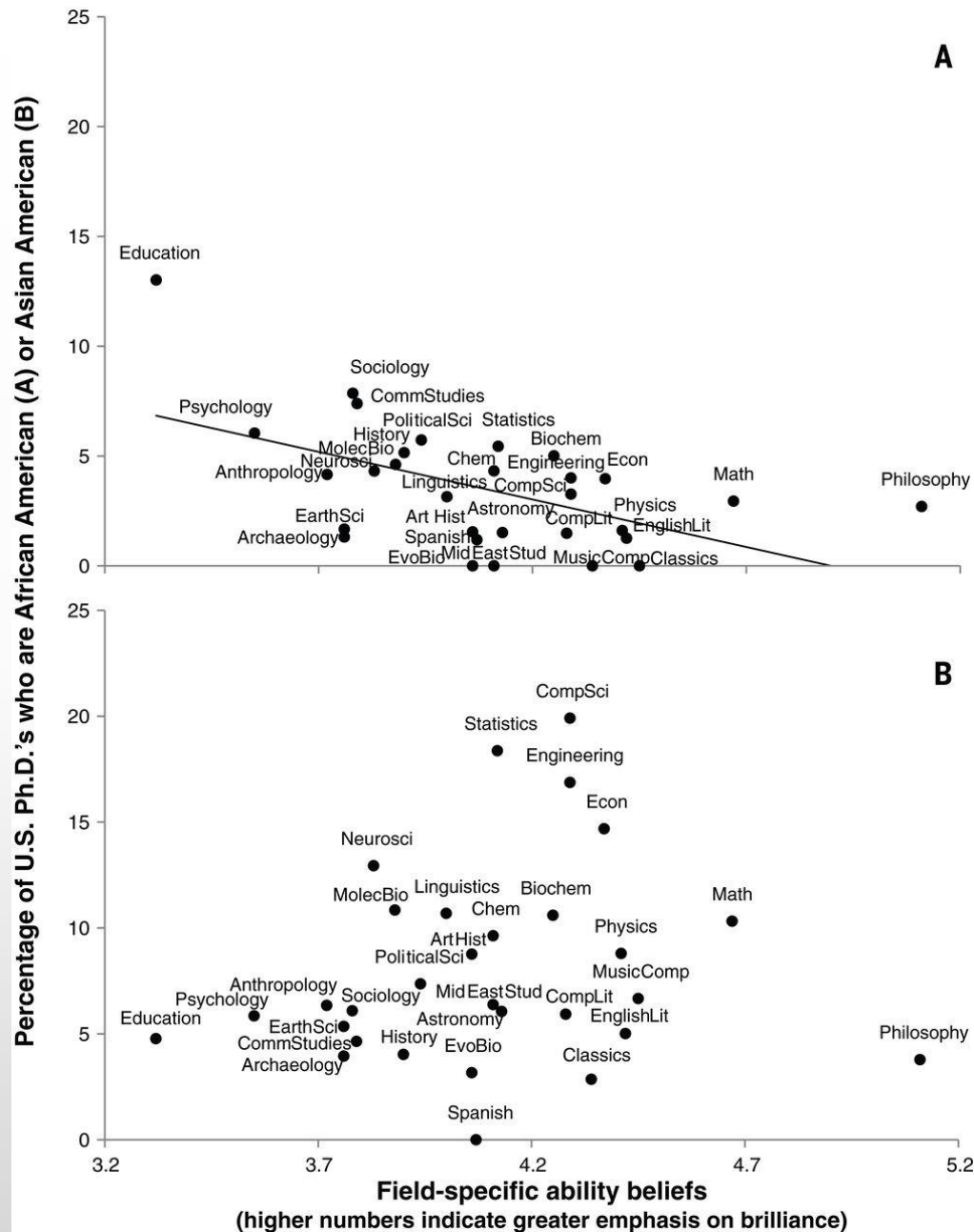
„The more a field valued giftedness, the fewer the female Ph.D.'s.“

Expectations of brilliance underlie gender distributions across academic disciplines

By: Sarah-Jane Leslie, Andrei Cimpian, Meredith Meyer and Edward Freeland

Science 347, 262 (2015), DOI: 10.1126/science.1261375

<http://science.sciencemag.org/content/347/6219/262>



“As with women, field-specific ability beliefs were the only significant predictor of African American representation.”

Expectations of brilliance underlie gender distributions across academic disciplines

By: Sarah-Jane Leslie, Andrei Cimpian, Meredith Meyer and Edward Freeland

Science 347, 262 (2015), DOI: 10.1126/science.1261375

<http://science.sciencemag.org/content/347/6219/262>

Leslie et al.: The field-specific ability beliefs hypothesis

“The extent to which practitioners of a discipline believe that success depends on sheer brilliance is a strong predictor of women’s and African Americans’ representation in that discipline. Our data suggest that academics who wish to diversify their fields might want to downplay talk of innate intellectual giftedness and instead highlight the importance of sustained effort for top-level success in their field. We expect that such easily implementable changes would enhance the diversity of many academic fields.”

Expectations of brilliance underlie gender distributions across academic disciplines

Leslie et al, Science 347, 262 (2015), DOI: 10.1126/science.1261375

Gender Differences in Vocational Orientation

PISA 2015: Focus on natural sciences, approx. 540,000 students, representing the approx. 29 million 15-year-olds in schools in the 72 participating countries

Results from Germany:

Differences between boys and girls in terms of their involvement and career ideas in the natural sciences seem to be more related to **differences in the assessment of their own abilities** and personal benefit of certain activities than to actual differences in performance.

PISA 2015 https://www.oecd.org/berlin/themen/pisa-studie/PISA_2015_Zusammenfassung.pdf

Gender Differences in Professional Interest

PISA 2015: Focus on natural sciences, approx. 540,000 schoolchildren, representing the approx. 29 million 15-year-olds in schools in the 72 participating countries

Results from Germany:

Stereotypical notions of scientists and activities with a scientific reference - e.g. the idea that computer science is a “male” and biology a “female” discipline, or that natural scientists owe their success to a special talent and not to hard work, or clichés like that of the “crazy scientist” - can deter some students from doing so to delve deeper into the natural sciences.

PISA 2015 https://www.oecd.org/berlin/themen/pisa-studie/PISA_2015_Zusammenfassung.pdf

Teachers Attitudes

Research report *Gender in der akademischen Lehre an Thüringer Hochschulen (GeniaL)*

The various disciplines are perceived by the teachers as being dominated by men or women, but this dominance is not perceived as a problem.

Teachers assign stereotypical attributes.

- Female students: order, hard work, goal orientation and insecurity.
- Male students: flexibility, creativity, negligence and self-confidence.

In the STEM courses, it is explicitly stated that the focus is on technical - and therefore gender-neutral - content and that scientific thinking is in the foreground.

<http://www.genial-in-thueringen.de/projects/projektinfos/>

FIELD-SPECIFIC ABILITY BELIEFS CAN EXPLAIN FEMALE UNDERREPRESENTATION

Beate Curdes, Hochschule Bochum

Thank you for your attention

Virtual Research Training Group Autumn Workshop

October 2020