

## **Gender Stereotypes in Science Education Resources**

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### *In brief*

More men are studying and working in science fields than women. This could be an effect of the prevalence of gender stereotypes (e.g., science is for men, not for women). The goal of this study was to determine whether online science education resources for primary school contained gender-biased visuals. The number of men and women depicted, and their professions were noted. The analysis revealed a stereotypical representation of men and women: more men were depicted with a science profession and more women were depicted as teachers. We should aim for a more balanced representation to create an essential first step towards showing children that both men and women can do science, which will hopefully lead to more gender-balanced science and technology fields.

### *Rationale*

The workforce in science related fields consists mainly of men (76%). Attracting more women to work in the STEM fields is vital: their knowledge would otherwise form an untapped source. Gender stereotypes might be an underlying factor of why fewer girls than boys choose to study STEM courses in the first place. Stereotypical images of science and scientists (i.e., images of male scientists) might present a negative correlation with the self-image of girls, causing girls to be less interested in science or in becoming a scientist. Moreover, gender stereotypical images of scientists can even directly affect boys' and girls' performance in science exercises.

The focus of the present study lies on identifying gender bias in visual content of science education resources. It is especially relevant to study the portrayal of men and women in education resources since they form the main source from which children acquire their ideas of science and scientists. The visual content of education resources should, therefore, be gender-balanced in order to

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prevent a stereotypical view of the roles of men and women in society in general and in science in particular.

### *Methods*

#### Sample

This content analysis investigated the visual content of 333 online science education resources from the websites of Scientix and OERcommons. Scientix is a project funded by the European Union. OERcommons is an international website for open education resources. The studied resources had the following features:

- Primary school level
- Science field: astronomy, biology, chemistry, geology, mathematics, physics, and technology
- English language

#### Analysis

The visual content analysis was conducted manually. Every visual in the resources was scanned for:

- The number of men and women
- The profession of every man and woman

Two coders coded a subset of the sample, after which one coder coded the entire sample. For the categories teacher and science profession a sufficient intercoder reliability was obtained for both genders (K-alpha = 0.70).

Chi-squared tests were performed to investigate whether there were any significant differences in the type of profession for each gender. The null hypothesis (equal distribution of men and women depicted as teachers and as scientists) was rejected under  $p < 0.05$ .

### *Results*

In total, 3,191 depicted people were coded. Figure 1 shows the gender distribution for men and women depicted as either in a science profession or in a non-science profession. The figure shows that there were many more men than women with a science profession (75.0% versus 25.0%, respectively), and fewer men than women were depicted as a teacher (36.1% versus 63.9%, respectively).

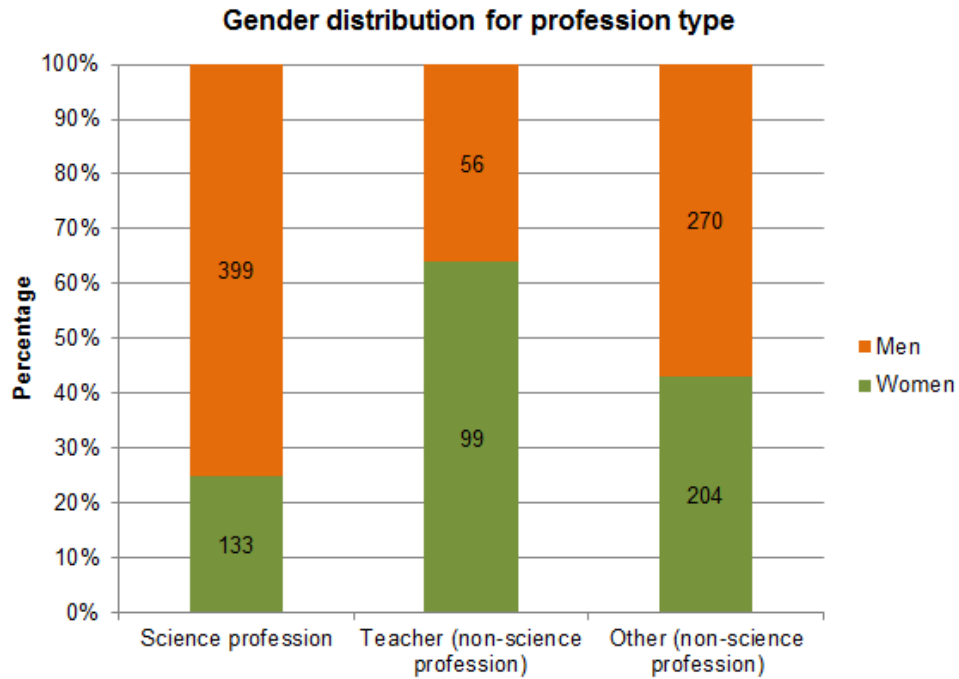


Fig 1. Gender distribution for profession type. N(people) = 1161.

Figure 2 shows the distribution of profession type for each gender. In total, most men depicted in the science education resources were depicted with a science profession (55.0%). Very few men were depicted as teachers (7.7%). Most women were depicted with an “other” type of profession (46.8%), followed by a science profession (30.5%) and finally, as a teacher (22.7%).

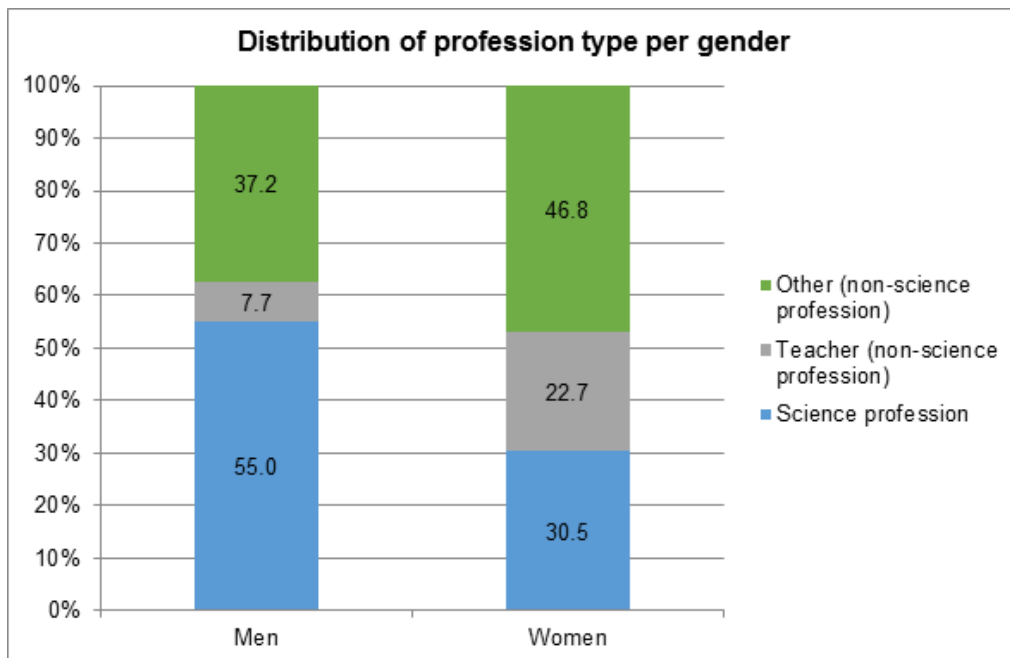


Fig 2. Distribution of profession type per gender. N(men) = 725; N(women) = 436; N(total) = 1161.

To answer the question whether there were more men depicted with a science profession given that there is a general overrepresentation of men in these resources (62.4% men versus 37.6%

women), a chi-squared test was performed and shows significant differences for science profession ( $p < 0.0001$ ) and teacher ( $p < 0.0001$ ). This means that, even after correcting for a general overrepresentation of men in the visuals, there were significantly more men than women depicted with a science profession, and significantly more women than men were depicted as teachers.

### *Recommendations*

How to counteract gender stereotypes in science education?

- Balance the numbers of men and women in visual content and text
- Balance the type of professions and activities of men and women
- Use gender-balanced language (e.g., using “humanity” or “people” instead of “man”)
- Use gender-balanced teaching methods and attitude to increase students’ interest in science
- Teachers could provide better explanations of science careers
- Female scientists can be invited to the classroom

### *Conclusions*

In these online science education resources, women and men are portrayed in stereotypical ways, with more men depicted with science professions and more women depicted as teachers. We should aim for a more balanced representation in order to interest both girls and boys for science. Hopefully, gender-balanced science education resources will help to increase the number of girls with an interest in science, and will lead to more women in STEM professions.

### *More information*

Paper submitted. Raw data available here: [https://github.com/unawe/gender\\_science\\_edu](https://github.com/unawe/gender_science_edu)