

We23

World's Largest Conference for  
Women in Engineering and Technology

# GENDER BALANCE IN STEM IN THE WORLD FROM EDUCATION TO EMPLOYMENT

By Claudine Schmuck

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MASROOR  
SWE Member  
Civil Engineering



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# CONTENTS

## TEENAGERS

- Proportions of teenagers who intend to pursue STEM-related careers and levers to boost these numbers.

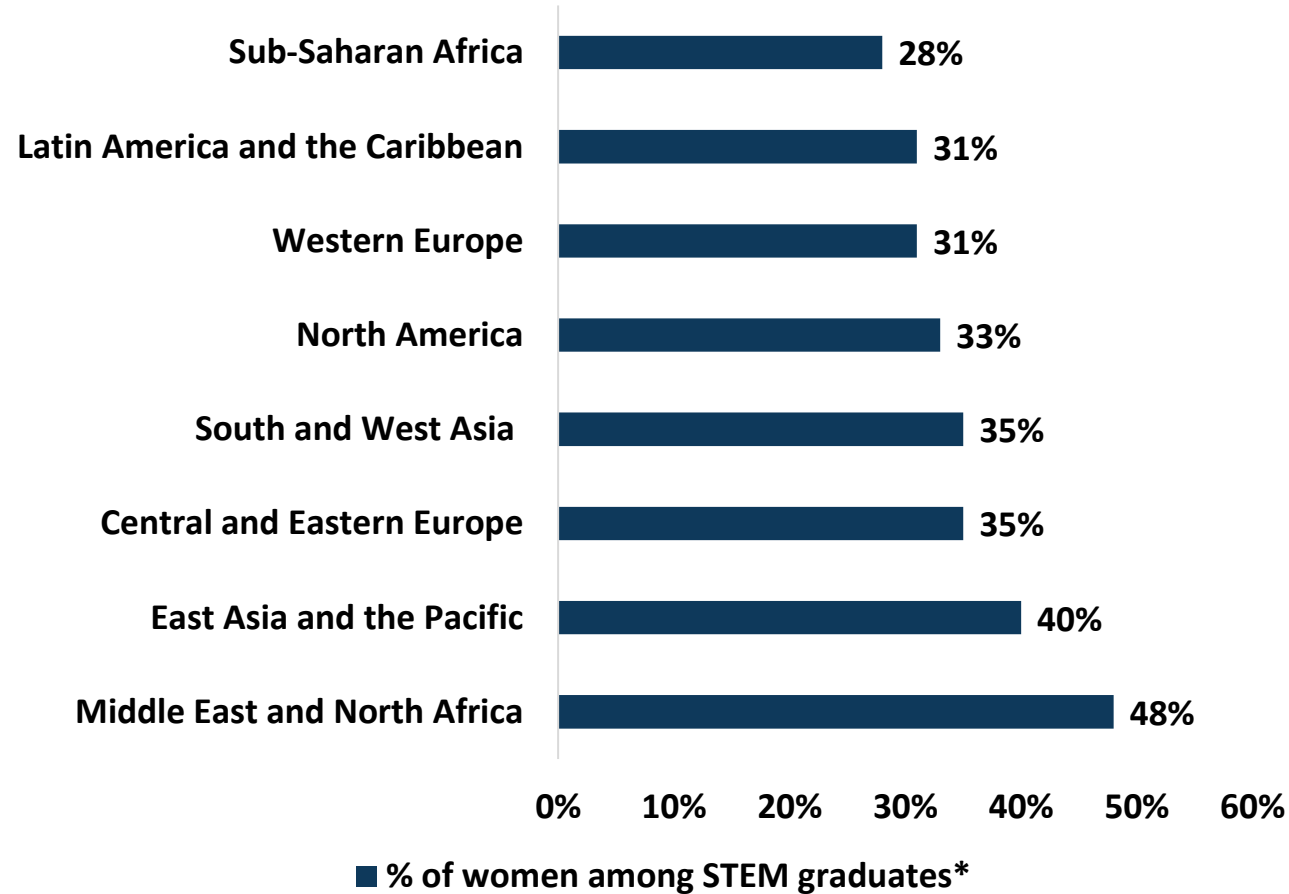
## STUDENTS

- Proportions of STEM higher education students who have been discouraged from STEM, by whom and with which arguments, and their experiences in their studies.

## WORKERS

- Proportions of satisfied STEM workers in total, and with the three essential pillars of the work experience (work organization, career management, parental support).

## DIFFERENT DYNAMICS AT WORK ACROSS THE GLOBE REGARDING GENDER BALANCE AMONG STEM GRADUATES



\*According to the latest  
UNESCO UIS Data

**HIGHER % OF GIRLS IN THE DEVELOPING WORLD INTERESTED IN STEM JOBS**

**What career would you like to pursue when you grow up?**

**Developing countries**



**Developed countries**



- 1. Engineer – 15%**
- 2. Technician – 11%**
- 3. Businessperson – 7%
- 4. Military – 6%
- 5. Teacher – 5%
- 6. IT professions – 4%**
- 7. Lawyer – 4%
- 8. Doctor – 3%
- 9. Veterinarian – 3%
- 10. Police officer – 3%

- 1. IT professions – 18%**
- 2. Engineer – 9%**
- 3. Teacher – 8%
- 4. Paramedical jobs – 7%
- 5. Artist – 5%
- 6. Lawyer – 5%
- 7. Doctor – 5%
- 8. Scientist – 4%**
- 9. Businessperson – 3%
- 10. Hospitality jobs – 3%

- 1. IT professions – 13%**
- 2. Engineer – 13%**
- 3. Doctor – 7%
- 4. Technician – 6%**
- 5. Scientist – 5%**
- 6. Teacher – 4%
- 7. Paramedical jobs – 4%
- 8. Hospitality jobs – 4%
- 9. Veterinarian – 4%
- 10. Airplane pilot – 3%**
- 11. Businessperson – 3%

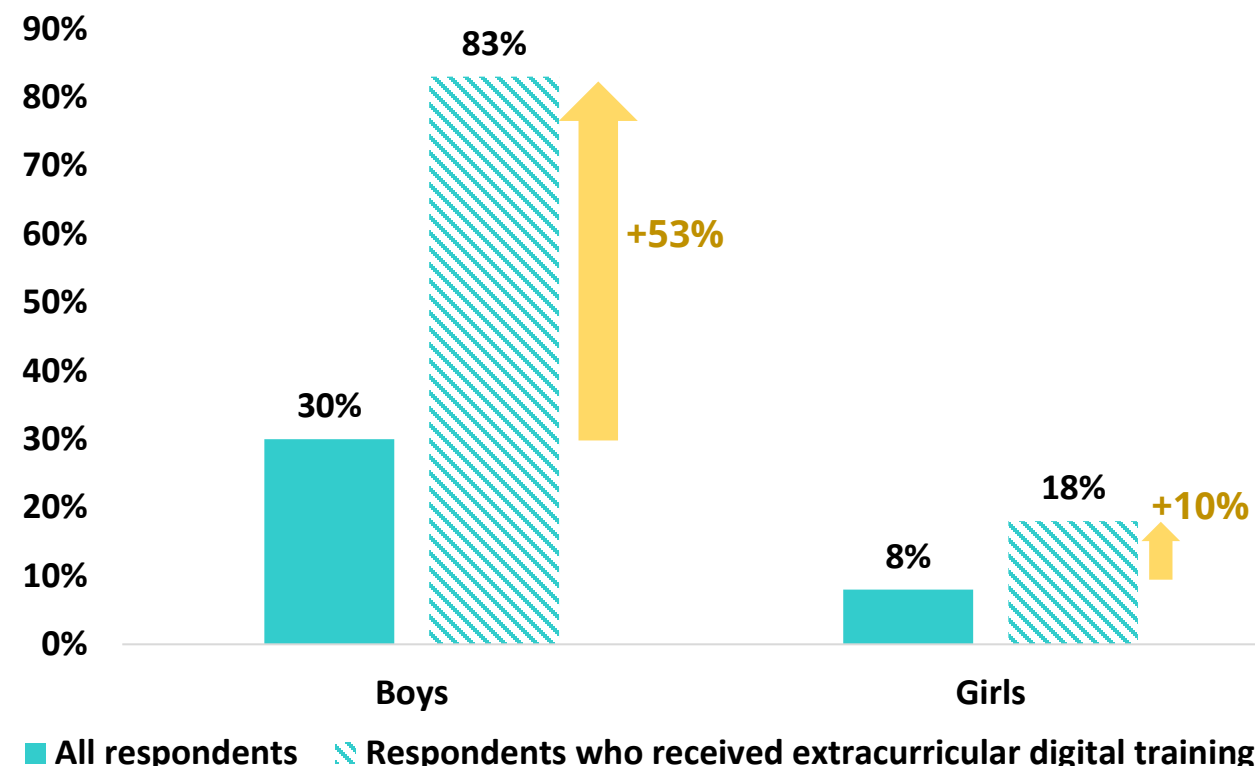
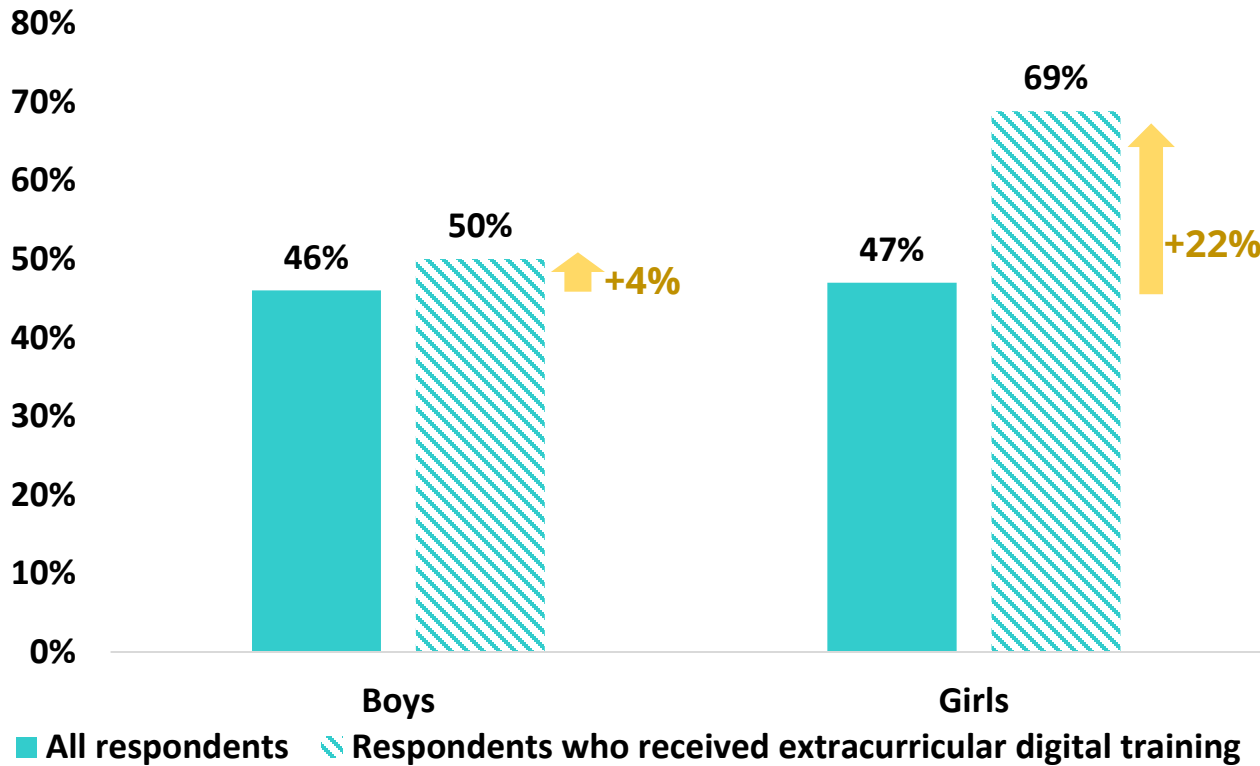
- 1. Doctor – 16 %
- 2. Paramedical jobs – 16 %
- 3. Teacher – 10 %
- 4. Veterinarian – 8 %
- 5. Artist – 6 %
- 6. Lawyer – 4 %
- 7. Police officer – 4 %
- 8. Architect – 4%
- 9. Hospitality jobs – 3%
- 10. Stylist – 3%
- 11. Scientist – 3%**

**THE WISH TO WORK IN ICT IS MORE GENDERED IN THE DEVELOPED WORLD**

**When you're older, would you like to work in the IT sector?**

**Developing countries**

**Developed countries**





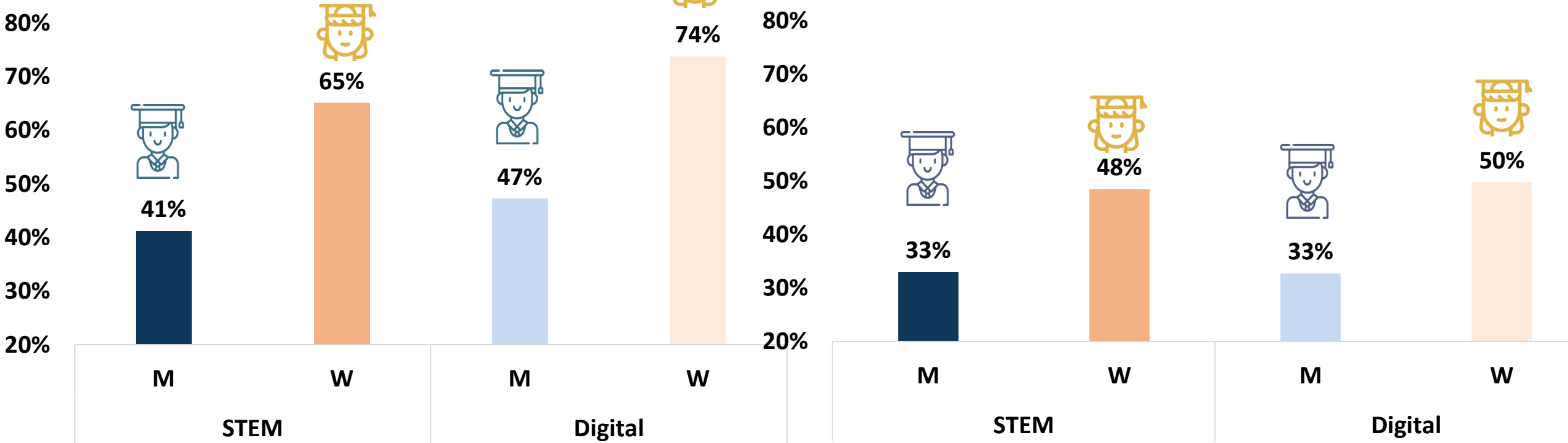
## A HIGHER PROPORTION OF WOMEN STUDYING STEM HAVE BEEN DISCOURAGED FROM GRADUATING IN SCIENCE OR TECHNOLOGIES

Have you ever been discouraged from choosing scientific and technical fields?

Developing countries

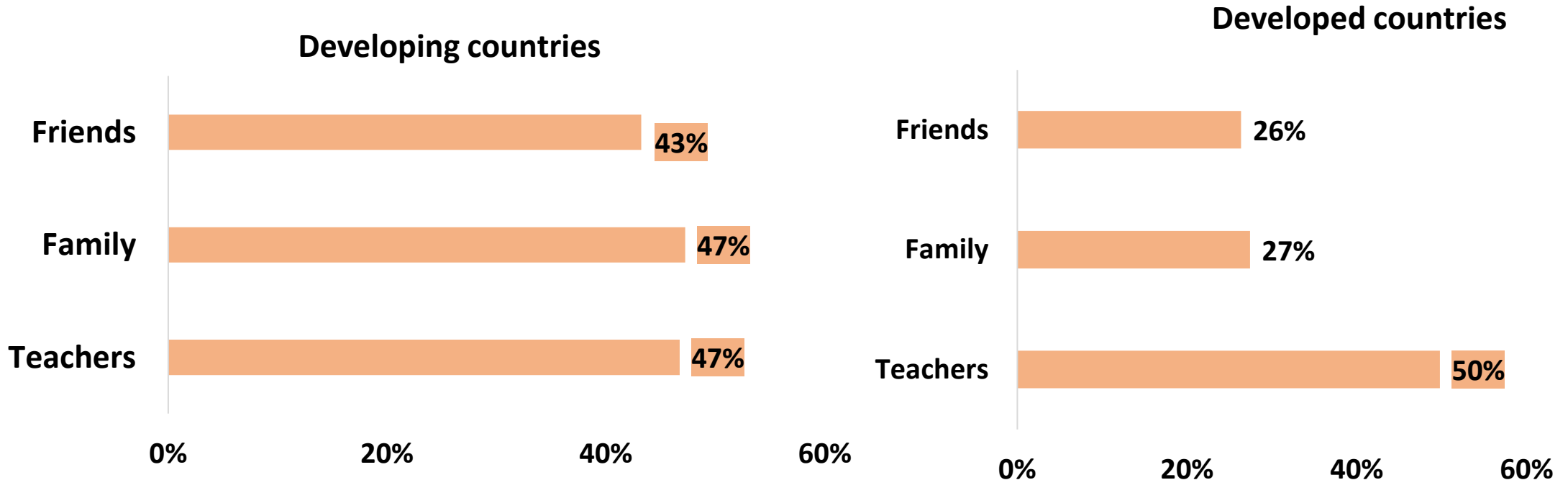


Developed countries



## FRIENDS, FAMILY AND TEACHERS DISCOURAGE A HIGHER % OF WOMEN IN DEVELOPING COUNTRIES

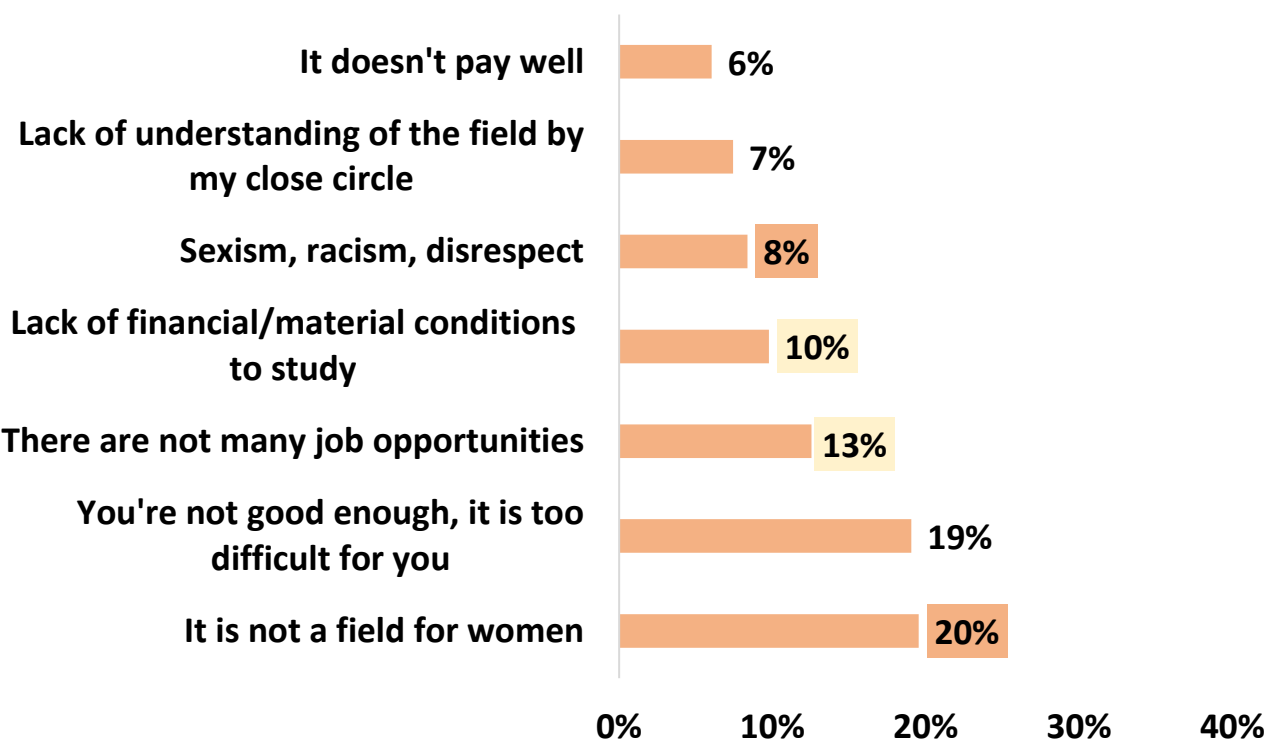
Who discouraged you from pursuing scientific and technical fields?



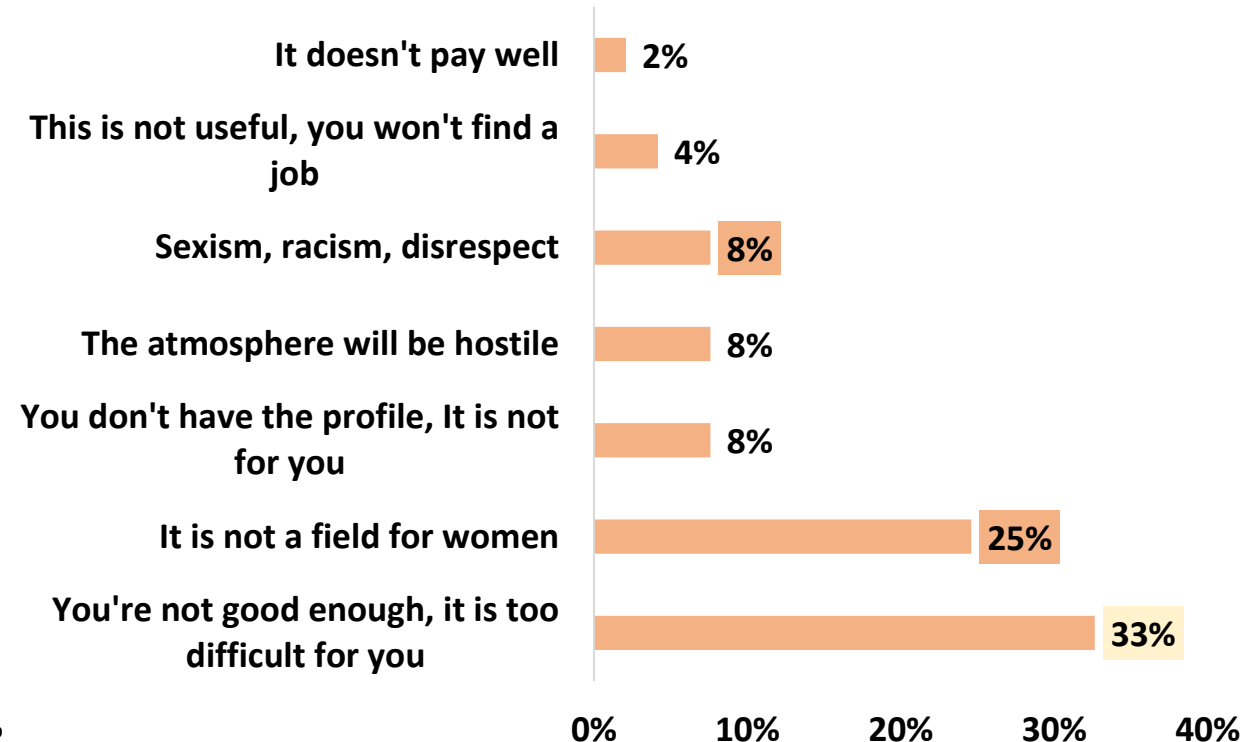
**INSUFFICIENT LEVEL, WHICH LEADS TO CONFIDENCE PROBLEMS, MORE LIKELY TO BE EVOKED IN THE DEVELOPED WORLD**

**Which arguments were evoked to discourage you from pursuing these professions?**

**Developing countries**



**Developed countries**





## Which arguments were evoked to discourage you from pursuing these professions ?



### **This is not a job for women**

"I was told technology is only for men..." Several teachers said that women have to be at home cleaning, cooking and taking care of children. In high school I took computer science, with 24 boys and 4 girls. I had to alienate myself to belong. I put up with horrible comments and abuse. Teachers made inappropriate comments that made me not want to be there" *Argentina, woman, 20, student in computer sciences*

"Family acted surprised at my interest, then expressed concern over 'family balance' in such a demanding career. Teachers questioned if I could handle it or suggested that I would do better in social sciences or communications. Peers underestimated my abilities in extracurriculars like robotics and physics club and stated I had little understanding of topics I had been working on for years." *United States, woman, 18, student in Engineering*



### **You are not good enough, it is too difficult for you**

"One tutor told me it wasn't a career for me because I wasn't smart enough." *Argentina, woman, 20, student in engineering*

"Some people, especially male classmates and teachers, gave me the idea that if I got good grades, it was because I was responsible and put time into it, but I wasn't bright enough to do a pure science degree." *Netherlands, woman, 23, Student in Physics*

## Which arguments were evoked to discourage you from pursuing these professions? – Developing countries

### Lack of financial/material conditions to study

“The high cost of education and the family’s financial needs.” *Panama, woman, 26, student in engineering*



“I could only use the computer for one hour a week until I was 18, and as I was the least computer literate, I always thought a career in computing was not for me.” *Argentina, woman, 28, student in computer sciences*

“Just the lack of material resources to afford the cost involved in studying.” *Algeria, woman, 25, student in natural sciences, biology, chemistry*

### Lack of understanding of the field by my close circle



“Relatives and friends had prejudice with the area and thought it was less important and valued than law, medicine or engineering, so they discouraged me from it.” *Brazil, woman, 24, student in computer sciences*

“The fact that in the family most are lawyers, policemen or psychologists, in other words, very common careers. I heard comments like ‘you like to go looking for trouble’, ‘why such a different career?’.” *Panama, woman, 18, student in environment, sustainable development, ecology*

## Which arguments were evoked to discourage you from pursuing these professions? – Developed countries

### The atmosphere will be hostile

“Fear of having more difficulties to be accepted and having to prove myself more than others.” *Austria, woman, 22, student in engineering*



“This is not a women`s space. You will feel isolated, you won`t be able to fit in and be integrated.” *Belgium, woman, 20, student in engineering*

“There is a general consensus especially in the media that it is something totally unique and special if a woman can succeed in technology because the people in that sector are so bad to women. This was very scary at first but now I feel I have tools to handle it.” *United States, woman, 21, student in engineering*

### You don`t have the profile, it is not for you

“A family member and a friend expressed that they didn't think engineering fit my personality because I am generally social and love working with children.” *United States, woman, 21, student in engineering*



“It`s best if you become a doctor (to help people) or a writer (because you love literature) and everyone knows you can`t do anything creative with maths. That`s what I heard.” *Canada, woman, 25, student in mathematics`*

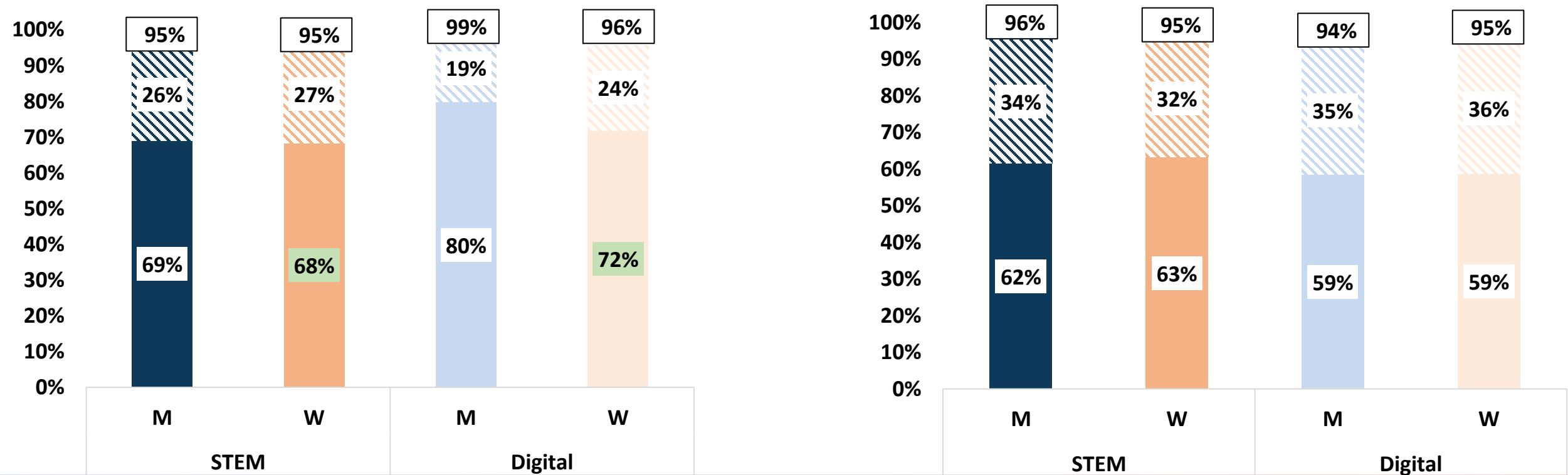
## VERY HIGH PROPORTIONS OF SATISFIED STUDENTS, WITH MORE HIGHLY SATISFIED STUDENTS IN DEVELOPING THAN IN DEVELOPED COUNTRIES

Are you satisfied with your choice of specialization of study?

Developing countries

■ Yes, absolutely    ▨ Yes, a little bit

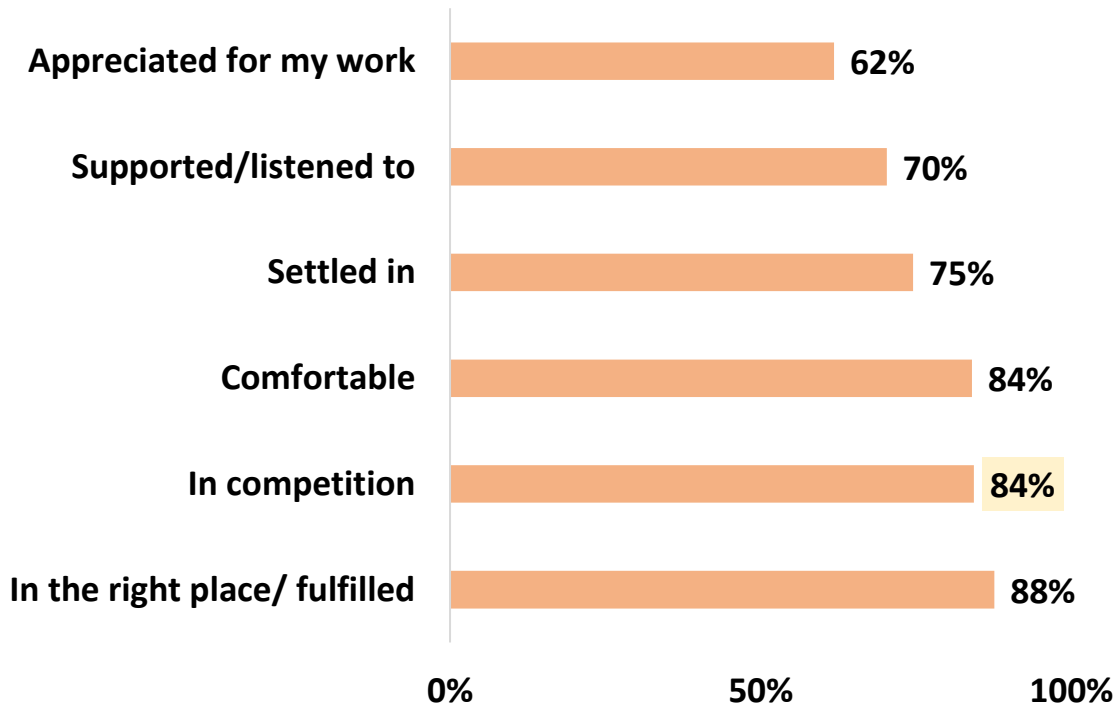
Developed countries



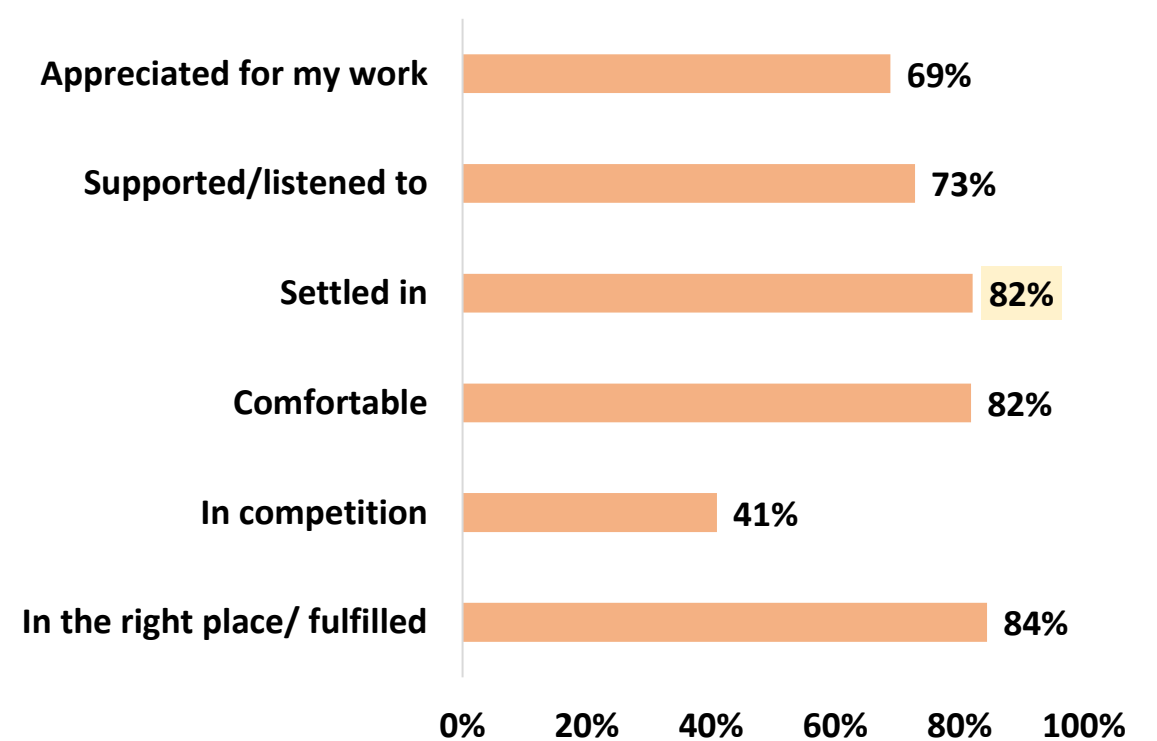
**SIGNIFICANTLY HIGHER PROPORTIONS FEEL IN COMPETITION IN DEVELOPING THAN IN DEVELOPED COUNTRIES**

**In your training, you generally feel...:**  
(% of answers "yes" and "yes, absolutely")

**Developing countries**



**Developed countries**

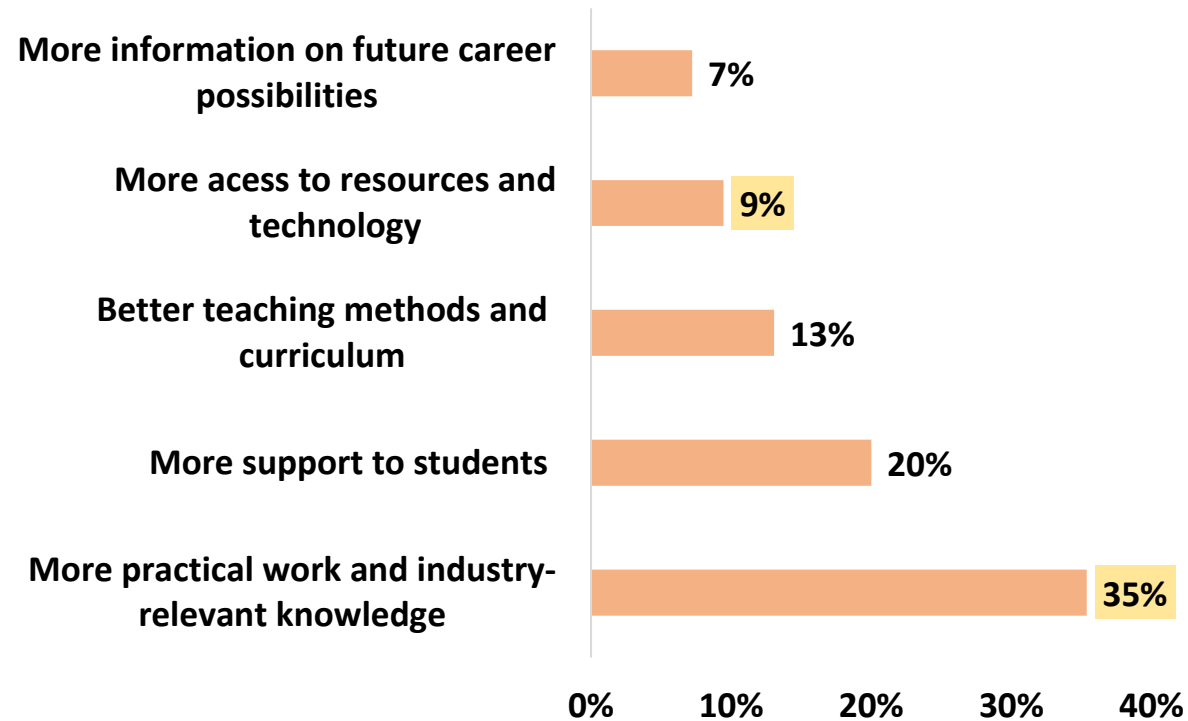


## ACCESS TO RESOURCES MENTIONED IN DEVELOPING COUNTRIES AND DIVERSITY IN DEVELOPED COUNTRIES IN THE TOP 5

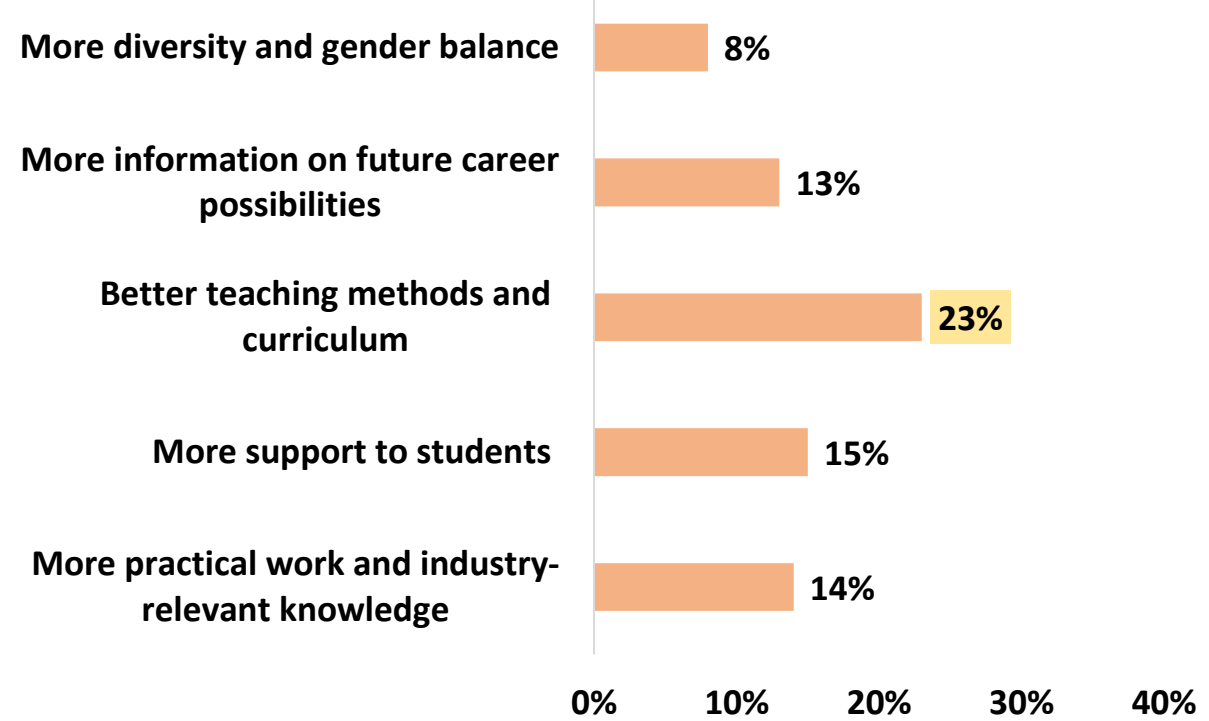
What improvement would you like to see in the training you are taking?

(open answers)

Developing countries

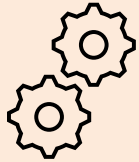


Developed countries





## What improvement would you like to see in the training you are taking?



### More practical work and industry-relevant knowledge

“I would like to see more real-world application. I think it would be more useful to spend a whole semester as an intern for a company instead of taking technical classes.” *United States, woman, 20, student in engineering*

“More practical work and hands-on approaches to improve specific skills on one's own.” *Colombia, woman, 18, student in computer sciences*



### Better teaching methods and curriculum

“I would like my department to make a real effort to teach according to modern pedagogical principles, not only to do the same thing they have been doing since the early 19th century” *Canada, woman, 25, student in Mathematics*

“Different modes of assessment to evaluate students' capabilities. Be exposed to new methods so that we can develop our skills further. Exams only stress out and test the ability to learn things.” *Pakistan, woman, 25, natural sciences*

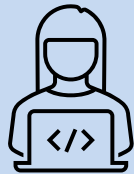


### More support to students

“Teachers should try to empathize with the students and with the level of stress we are under nowadays, especially women, who suffer more often from the impostor syndrome.” *Argentina, woman, 27, student in computer science*

“Changes in atmosphere, active intervention to improve the level of stress and sense of neglect.” *Spain, woman, 24, student in natural sciences, biology, chemistry*

## Which arguments were evoked to discourage you from pursuing these professions?



### More access to resources and technology – developing countries

“The availability of adequate lab and workshop materials and the restructuring of our current curriculum to make it more up to date.” *Zambia, woman, 22, student in engineering*

“The technology we use is obsolete, labs are not well equipped.” *Panama, woman, 20, student in engineering*

“Updating to new global knowledge, access to state-of-the-art technology, interaction with professionals from other countries.” *Guatemala, woman, 25, student in natural sciences, biology, chemistry*

### More diversity and gender balance – developed countries

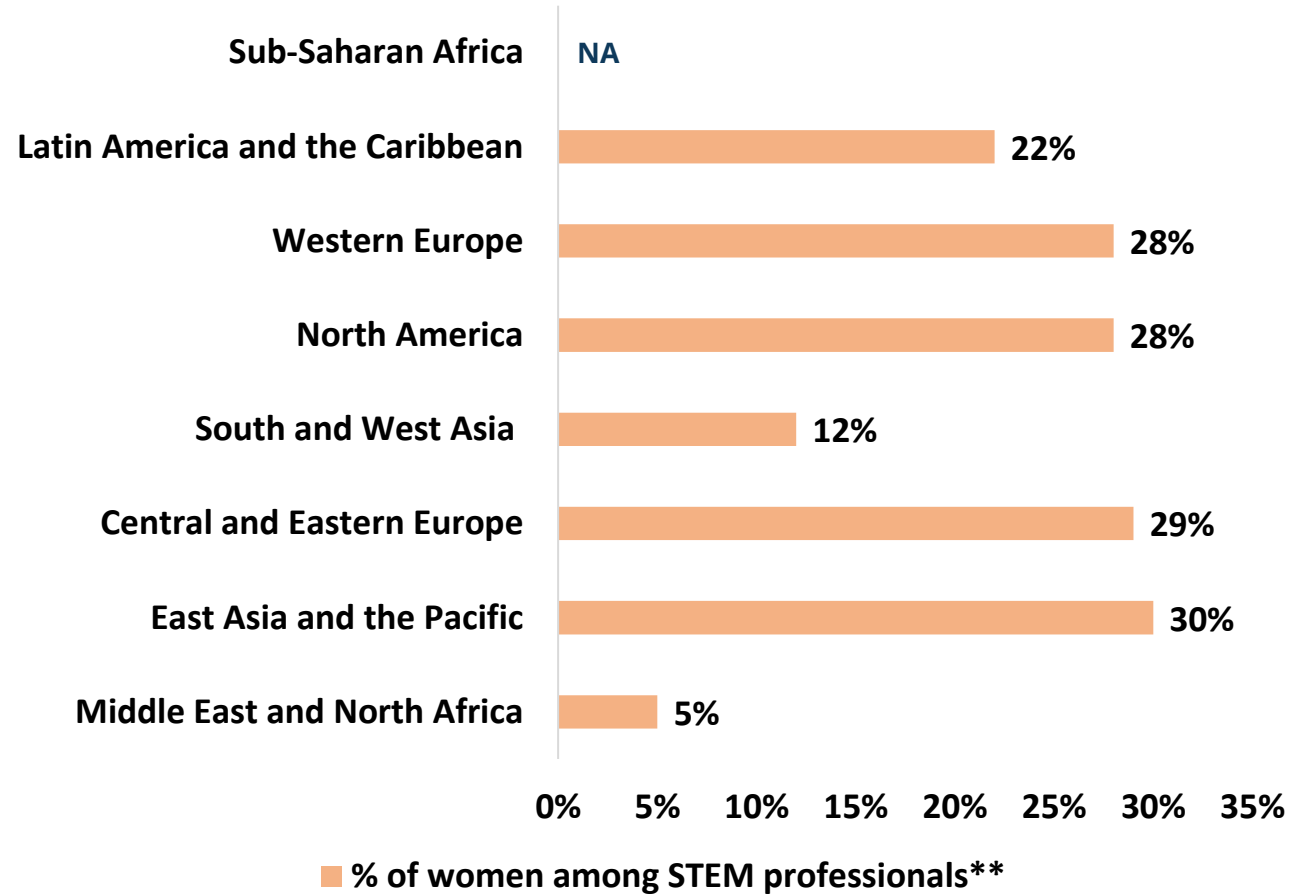
“More women and POC faculty/mentors.” *United States, woman, 28, student in engineering*



“Mandatory education for all genders about gender disparity in engineering and how to recognise and deal with it in the university/workplace.” *Ireland, woman, 25, student in engineering*

“More gender balance in the community and among mentors.” *Canada, woman, 22, student in environment, sustainable development, ecology*

## DIFFERENT DYNAMICS AT WORK ACROSS THE GLOBE REGARDING GENDER BALANCE AMONG STEM EMPLOYEES



\*\*According to the latest ILO Data

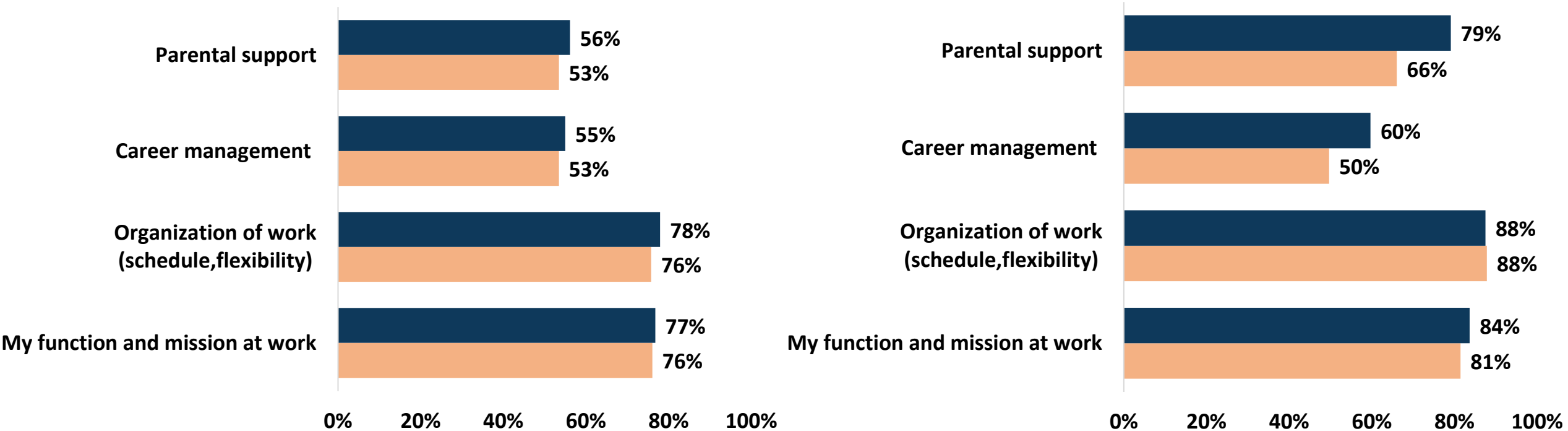
**PROPORTION OF SATISFIED IS HIGHER IN DEVELOPED COUNTRIES,  
AND SO ARE GENDER GAPS**

**Are you generally satisfied with...?**  
(responses "yes")

**Developing countries**

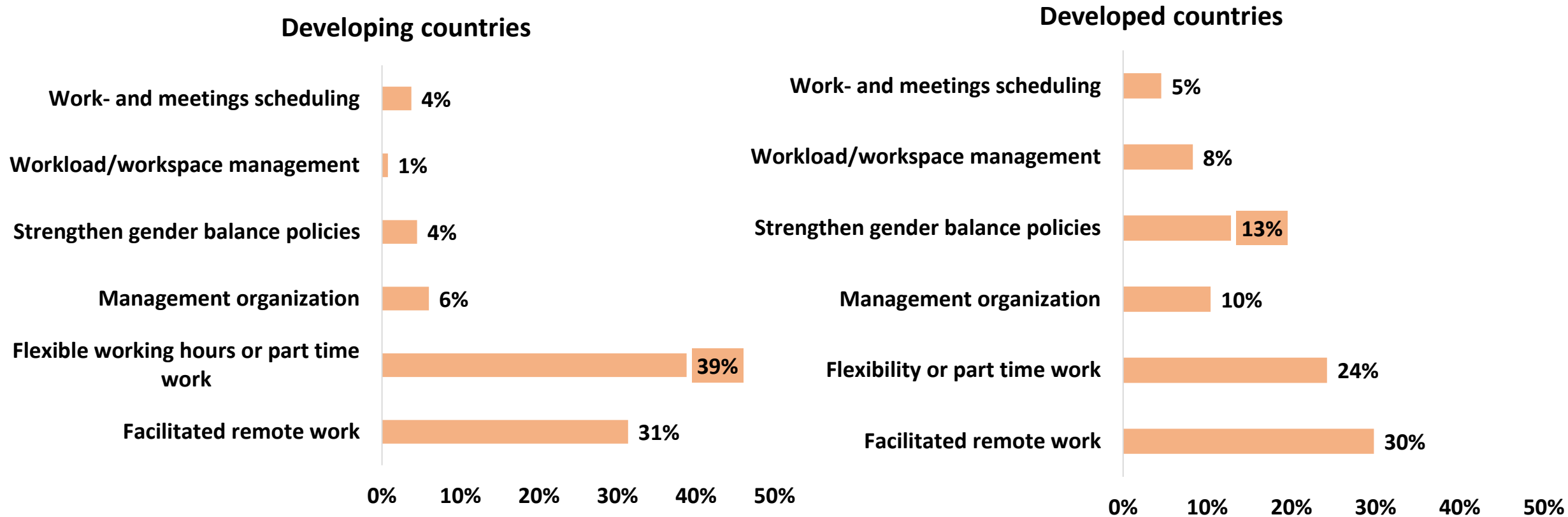
**Developed countries**

■ Men ■ Women



**FLEXIBLE WORK MORE DEMANDED IN DEVELOPING COUNTRIES,  
MANAGEMENT ORGANIZATION AND GENDER BALANCE IN DEVELOPED ONES**

**What measures would you like to see developed to improve your work organization?**



## What measures would you like to see developed to improve your work organization?



### Facilitated remote work

“100% teleworking if objectives are met, with the possibility of going to the office when the work demands it, no obligation on the part of the manager to set specific days.” *Spain, woman, 31-45 years old, technician*

“Allow employees to work remotely if their presence in the office isn't necessary.” *Algeria, woman, under 30 years old, manager/engineer*



### Flexible working hours or part-time work

“Flexible working hours. Many traffic jams to reach the office at normal times. I work with administrations that do not start work very early.” *Cameroon, woman, 31-45 years old, manager/engineer*

“More flex time rather than 8-5 workdays. Less focused on hours worked and more focused on amount of work completed.” *United States, woman, under 30 years old, manager/engineer*



### Better management organization

“That project assignments are informed in time and with a real deadline and not a very short one that does not allow to produce a good project/report/work.” *Peru, woman, under 30 years old, employee*

“Better internal management and allocation of personnel to the various activities and tasks to be carried out for a better distribution of the workload.” *Germany, woman, under 30 years old, employee*

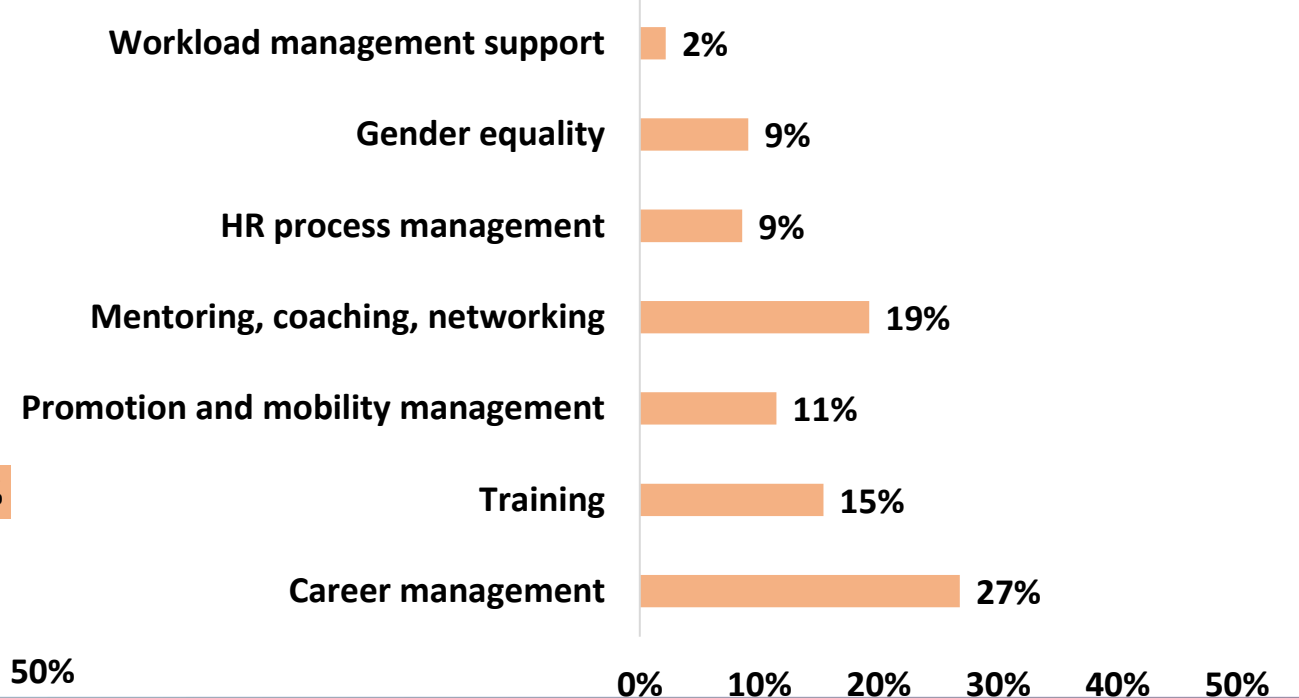
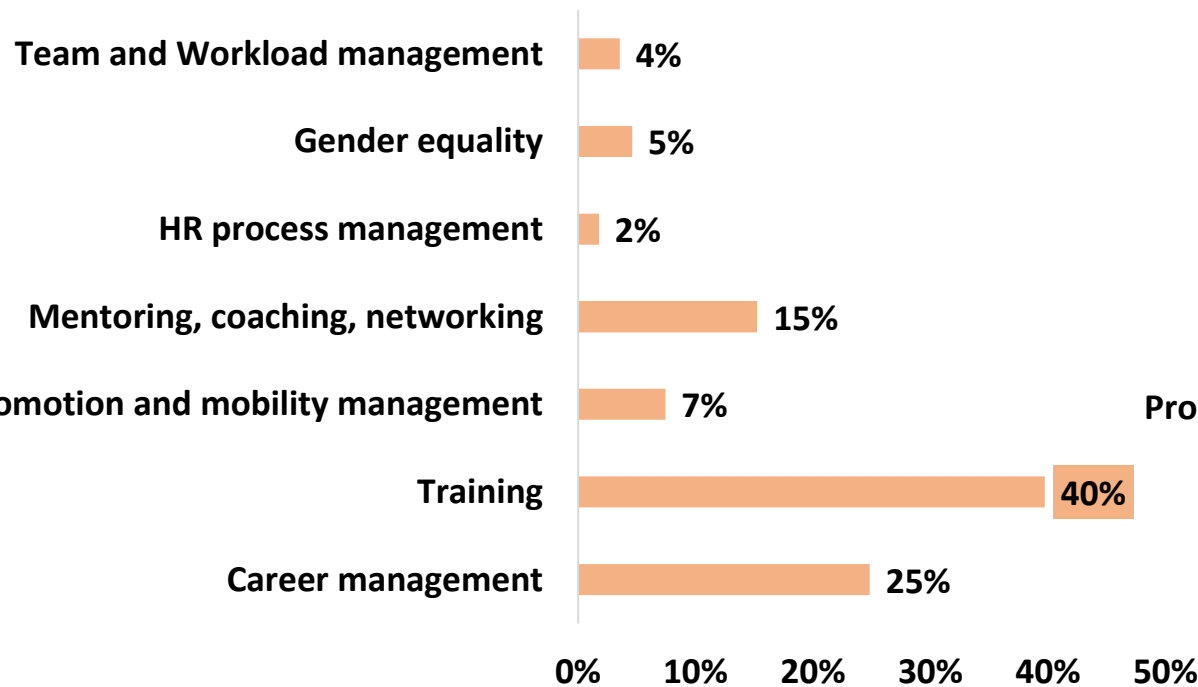


**STRONG SIMILARITIES OF REQUESTS OF IMPROVEMENTS ON CAREER MANAGEMENT, WITH A MUCH GREATER DEMAND FOR TRAINING IN DEVELOPING COUNTRIES**

**What measures would you like to see developed to improve career management?**

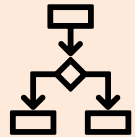
**Developing countries**

**Developed countries**



## What measures would you like to see developed to improve career management?

### Career management



“A career plan to know exactly how I can grow within the company.” *Brazil, woman, under 30 years old, technician*

“More structure around professional development and potential career paths within the organization.” *Canada, woman, under 30 years old, technician*

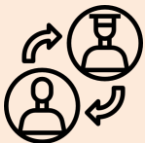
### Training opportunities



“Training courses and time to develop transversal activities that strengthen my professional level in the long term.” *Spain, woman, 31-45 years old, technician*

“That there were workshops or courses related to the work assigned to improve time and effectiveness. To enable us to learn about and implement technologies that help the organization.” *Peru, woman, under 30 years old, employee*

### Mentoring, coaching, networking



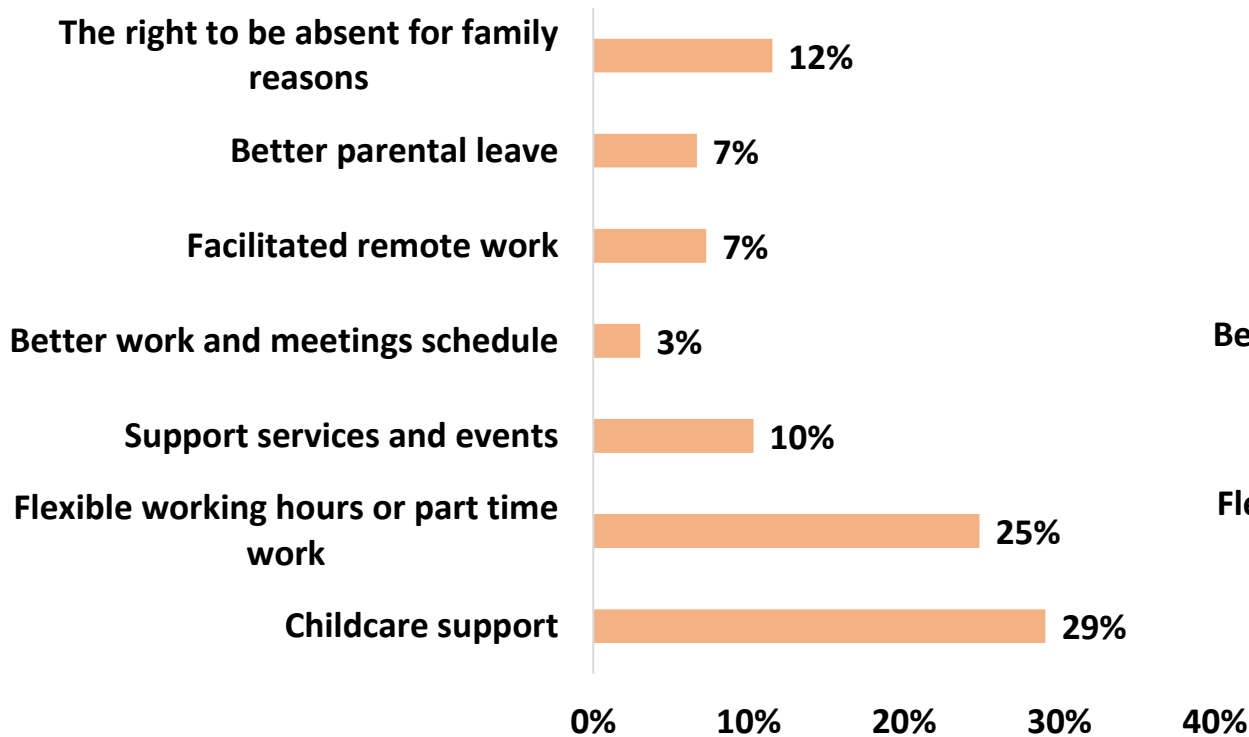
“Introduce mentorship program, where people in the leadership team mentor talents from the organization and then the talents pass it on through for young employees.” *Egypt, woman, 31-45 years old, manager/engineer*

“A career coach that gets involved with each team. Or a manager that supports and sponsors his/her team to progress in their careers... Instead of holding them back or downplaying their abilities” *Ireland, woman, 31-45, technician*

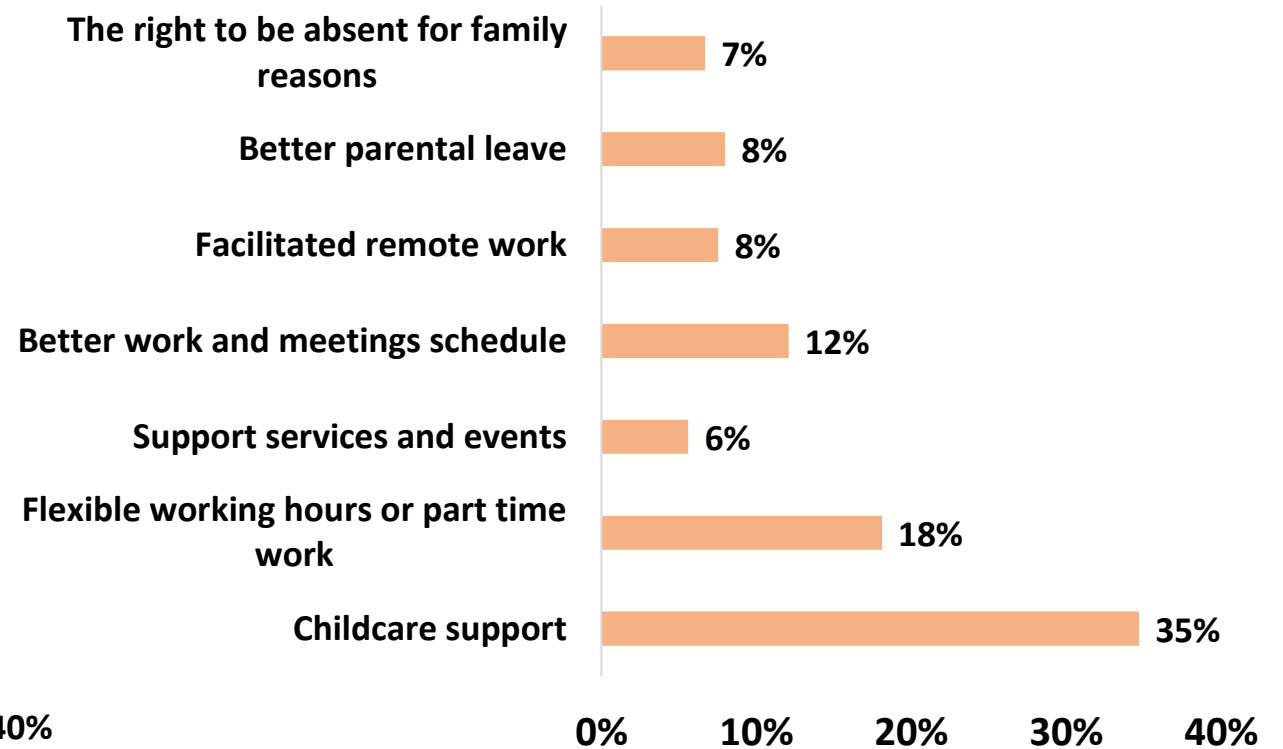
**CHILDCARE SUPPORT MORE DEMANDED IN DEVELOPED COUNTRIES,  
SUPPORT SERVICES & EVENTS AND FLEXIBILITY MORE IN DEVELOPING ONES**

**What measures would you like to see developed to improve parental support?**

**Developing countries**



**Developed countries**



## What measures would you like to see developed to improve parental support?



### Childcare support

“Childcare facilities organized by the employer for the cases of off-hour meetings and events, financial support to work travels with children.” *Finland, woman, over 45 years old, engineer/manager*

“Subsidy or full coverage of the childcare facility.” *Burkina Faso, woman, under 30 years old, technician*



### Flexible working hours or part-time work

“Possibility of working part-time for certain periods, in order to be more available to care for one's child in case of illness or other family circumstances.” *Ivory Coast, Woman, 31-45 years old, engineer/manager*

“Flexible hours to accommodate appointments for children and the ability to work earlier or later in the day.” *Canada, woman, over 45 years old, engineer/manager*



### Support services and events

“Offering activities (sporting, artistic, IT training) for employees' children.” *France, woman, 31-45 years old*

“Accompanying the employee on family trips and holidays. School follow-up to allow the employee to enjoy family time and to relieve him/her during the school cycle.” *Ivory Coast, woman, over 45 years old, engineer/manager*

# SUMMARY & ACTION ITEMS

## TEENAGERS

- Invest in hands-on, innovative **extracurricular activities** to stimulate interest in STEM.
- **Include parents & teachers in awareness-raising campaigns on STEM** careers.

## STUDENTS

- Deploy support programs to **improve women's integration** within the faculty (mentoring, coaching, training sessions).
- Develop awareness-raising campaigns on gender balance for staff, teachers and students.

## WORKERS

- Improve **career management processes**, providing personalized follow-up, training, mentoring, networking activities and establishing a women's internal network and pipeline.
- Improve the **access to and company's culture concerning parental support mechanisms**, ensuring women and men can use them, without being penalized for it.

# WE WANT TO HEAR FROM YOU!



Take the survey to leave feedback on my WE23 virtual session. Scan the QR code with your phone camera.