

Dis/Encouragements in becoming a physicist

Objectives

Participants will learn to reflect about their own biography and the decision making process on their occupation during childhood and adolescence. They will be enabled to get aware about possible encouraging and discouraging factors when deciding for their professional aim to become a physicist. Furthermore, they will get an impression how categories of gender, race, class and others can have hindering effects in pursuing their occupational aim respectively that some persons are privileged compared to others.

Introductory Notes

When getting interested in scientific fields or thinking of becoming a scientist, women and men can be influenced by a number of factors that have either encouraging or discouraging effects on the decision making process. Many of these push- and draw-back-factors are gendered: Men and women are ascribed to have different interests and aptitudes, competencies and abilities that are said to be typical for their gender. Young people can be confronted with these cultural stereotypes about men and women in the family, in school, by media, by their peer group and in other contexts.

Many studies that are based on Draw-a-scientist-tests (DAST) show that these cultural stereotypes run contrary to young women's motivations to become a scientist so that they can feel discouraged to decide for a career in science. However, individual teachers, parents, relatives, friends or others can also have a supportive influence and work as counter-stereotype, e.g. as role model. Further factors that can have an effect on a decision to begin a career in science are living conditions, key experiences and others.

Beyond gender stereotypes which can hinder in particular girls and young women to decide for science, also other categories of social inequality like race, class and others can discourage or even hinder young people's decision for science or, later on, slow down their career in science.

In the lesson the aim is twofold: Getting aware of the impact of categories like race and class on the chance to be supported in pursuing a career in science and, secondly, push- und draw-back-factors of family, friends, teachers, colleagues and other influential persons in the individual biography.

In the first part the **Privilege Walk** is centre stage. It is an intervention activity, based on the idea of Peggy McIntosh (1990), in order to let students get aware of privileges, in particular regarding race, and their importance for the everyday life of individuals. It is designed in a way that the

interplay between norms and diverse background of participants will become visible in any given context. For the context of academic careers it has been developed by Staffan Andersson (2014). He explains:

“In higher education [...] norms, values and expectations affect what is being recognized and accepted. The interplay with such cultural systems can have a critical influence on how people behave and succeed. [...] In this exercise all students are standing side by side at the beginning. Different statements are read, [...] the students react upon these statements by moving backwards and forwards. The diversity in the group becomes apparent in a very visual, and often emotional, way as students react in different ways and thereby move apart.” (Andersson 2014).

In this session’s version of the Privilege Walk the participants will take over the role of fictive personas of a physics community. These personas that are sketched on cards will be handed out to participants in advance so that they will do the Privilege Walk as the fictive persona. This is in order to get a wider diversity among the group which is important especially for groups that are rather homogeneously with respect to gender, race, age etc.

In the second part of the session an exercise on **Learning Biographies** stands centre stage. The aim is to recapitulate the decision process for a career in physics and its push- und draw-back-factors. The design of the activity is based on the model of learning biographies (Gudjons, Wagener-Gudjons, Pieper 2008).

In-Class-Time

240 minutes, including 30 minutes break.

Can be split in two sessions between Privilege Walk and Learning Biographies

Schedule and Teaching Instructions

Preparation for the session:

Prepare **persona cards** for the participants. Depending on the size of the group, you can have more than one card for each persona to be distributed in the sample since people might interpret the privileges of their persona differently.

Some examples of personas of a physics department community are (examples drawn from Andersson 2016):

You are a male senior lecturer in your thirties. You grew up, studied and struggled yourself to a PhD in a neighbouring country. You come from a working class home, and had little

contact with your family even before moving abroad. You think you have adapted rather well to the culture of your present country of residence and your colleagues.

You are a female senior lecturer in your thirties. You are unmarried and pregnant with your first child. You have had some problems with the pregnancy, and are not recommended to exert yourself physically. Your name and appearance indicate that you are of Asian descent.

You are a female: post doc in your thirties, working in a foreign European country. You have a hearing problem. Which has not bothered you very much, but it is a little more of a problem now that you are in a foreign-language environment. You rarely take part in informal gatherings. People are nice to you, but you don't share their interests or their sense of humour.

Prepare the **statements** for the walk. The statements should be formulated and chosen according to the focus of a physics department community.

Some examples for the context of natural sciences are (examples drawn from Andersson 2016):

You rarely, if ever, experience being seen as a representative of a gender group.

You have never been told that science is not for you.

You feel that you belong to the department.

You rarely worry about the continuation of your employment.

Portraits and pictures at the department mostly portray people like you.

You can easily go to interesting conferences on short notice.

You have never experienced a joke that offended you at the department.

You never feel unsafe at the department, on the campus or on your way home when you have been working late at night.

You feel that your students respect you.

You have never been told that "you don't really look like a scientist".

You have never had concerns about being sexually harassed.

Homework for the participants in preparation for the session:

- Read the article of Ong (2005)

Privilege Walk:

60 minutes

- 1) Hand out persona cards which have been prepared before the class.

- 2) Participants read their descriptions and reflect upon their persona for roughly 5 minutes.
- 3) The proper exercise starts with all participants standing side by side about an arm's length apart, leaving space in front and behind at one side of the room.
- 4) Explain to them that a number of statements will be read.
- 5) They should take one step forward if they feel their persona agrees with the statement or the is appropriate for their persona. Everyone else who feels this statement does not hold for her persona will stand still. Each step should be an average length step.
- 6) Read all the statements one at a time allowing time for participants to take a step.

During the concluding part of the exercise when all the statements have been read, let the participants reflect upon results and discuss what happened. This can initially be done standing in the "landscape" resulting from the walk, but can later continue in a group format.

Some examples of reflection questions (cf. partly Andersson 2016):

- What are your thoughts on what has happened here?
- Why do you think this happened?
- How did it feel to remain standing while others walked ahead?
- How did it feel to walk ahead when others were left behind?
- Why did you end up here?
- What did you attribute to your persona?
- What could have helped your persona to take more steps forward? Think of the strategies of the women of colour that Ong describes in her article.
- What factors affect who proceeds in their academic career?
- Which are the underlying norms that affect academic careers?
- How do these affect the possibilities of different academic staff?

Participants' break:

15 minutes

Group Work:

60 minutes

Build groups. Groups should not be bigger than 4 people.

Exercise on Work Sheet in groups

The tasks are threefold:

- 1) Participants should reflect their biography concerning their decision process to become a physicist on their own on a sheet of paper.

- 2) They should exchange their results within their group.
- 3) They should discuss and evaluate their experiences in the light of their biography so far.
The leading question for this exercise is: Would I have decided differently today?

Participants' Break:

15 minutes

In preparation of the group presentation the leader draws all the bubbles on blackboard or flipchart.

Group Presentation:

90 minutes, depending on number of groups

Let each group present their results of push- und draw-back-factors as + or – signs in the respective bubbles via oral presentation at the blackboard/flipchart and let them present the results of their discussion (result of task 1 and 2, each for 15 minutes)

When all groups have presented, discuss the resulted + or – signs for each bubbles.

Discuss possible created new bubbles.

Have a plenary discussion of the discussion question of task 3.

Work Sheet: Dis/Encouragements in becoming a physicist



- 1) Remember the time when you made your **first decision** concerning your future/current profession or education. Write down next to the circles, what **influence on the decision-making process** you can think of relating to each area. If you feel, that something important is missing, you have a free circle available to use. Then draw arrows from the circles toward the mid - to your profession or education. Through the thickness of the arrows you can show how important the different areas of your decision were. Note with a + or – sign if the influences were supportive or had a rather drawing back effect on your decision process.

- 2) Compare the results in your group and collect push- and draw-back-factors.
Can you identify the impact of stereotypes of gender and of stereotypes of science?

- 3) Discuss the following questions:
 - Today, if I were in the same decision-making process again, how would I decide?
 - If I had been given the choice again, would I decide in the same way?
 - What do I like about my profession or education?
 - After making a decision on my education, how did my professional career proceed? Which influences were decisive?
 - How is my professional career supposed to go on? On what factors depends this professional progression?
 - If I come across stereotypes of gender and/or science, how do I reply to them? Exchange your experiences.

**School
teachers**

?

Family Tradition:

My parents
wanted me to be
...

**Friends, Class
Mates,
Neighbourhood
Children**

**Becoming a
Physicist**

**Childhood
Ambition:**

As a child I
wanted to be ...

Living Conditions
that hindered or
promoted me ...

**My Hero/ine
Role Model:**

I always wanted
to be like ...

Prohibited Careers

I was not allowed
to be a ...

Obligatory Reading

Maria Ong (2005): Body Projects of Young Women of Color in Physics: Intersections of Gender, Race, and Science. In: *Social Problems* 52 (4): 593-617.

Further Reading

Chambers, David (1983): Stereotypic Images of the Scientist: The Draw-a-Scientist Test. In: *Science Education* 67: 255-265.

Cheryan, Sapna (2012): Understanding the Paradox in Math-Related Fields: Why Do Some Gender Gaps Remain While Others Do Not? In: *Sex Roles* 66: 184–190

Shapiro, Jenessa; Williams, Amy (2012): The Role of Stereotype Threats in Undermining Girls' and Women's Performance and Interest in STEM Fields. In: *Sex Roles* 66: 175-183.

Steinke, Jocelyn et al. (2007): Assessing Media Influences on Middle School–Aged Children's Perceptions of Women in Science Using the Draw-A-Scientist Test (DAST). In: *Science Communication* 29 (1): 35-64.

Additional Resources and Materials

Andersson, Staffan (2014): *Privilege walk - A path towards understanding norms and stereotypes*. Abstract for the ICED 2014 -conference "Educational development in a changing world".

Andersson, Staffan (2016): *Privilege walk – A path towards understanding norms and stereotypes*. Unpublished manuscript for the Berlin – Uppsala Summer School "Diversity in the Cultures of Physics".

Gudjons, Herbert; Wagener-Gudjons, Birgit; Pieper, Marianne (2008): *Auf meinen Spuren. Übungen zur Biografiearbeit*. Julius Klinkhardt, Bad Heilbrunn.

McIntosh, Peggy (1990): *White privilege: Unpacking the invisible knapsack*. Independent School, 49(2): 31-36.