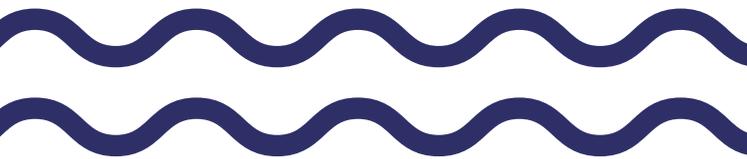

Britta Thege
Marike Schmeck
Mareike van Elsacker



Gender-Sensitive Teaching



An introduction
for teaching staff
in STEM



TABLE OF CONTENT



0.	Preface Introduction	2
1.	Why is gender important in teaching?	8
2.	Gender in curricula	12
2.1	Gender bias in academic teaching	13
2.2	Integrating gender in curricula	18
3.	Gender-sensitive teaching setups	28
3.1	Gender- & Diversity-responsive teaching and learning materials	30
3.2	Participatory teaching	36
4.	Checklist from all “Take aways”	48





“Gender-sensitive teaching in Marine Sciences is important to educate and sensitise the next generation of marine scientists and therefore contributes to an improved gender balance in the near future!”

Prof Dr Katja Matthes,
GEOMAR and coordinator of Baltic Gender



0 | Preface



Marine Sciences is, with Physics, one of the most male-dominated and masculinist subjects taught and researched in higher education. With few females researching and teaching, women are put off studying Marine Sciences, and this generates a self-perpetuating cycle of inequality. Women with caring responsibilities, women of colour and disabled women are even less likely to study and progress in Marine Sciences. It is not that women can't work with and on oceans and seas – there are plenty of examples of women deep free-divers (Haenyeo) and women-only circumnavigation teams (Expedition), as well as women scientists, but they are frequently less celebrated, and sometimes even airbrushed from history, as the Baltic Gender project has illustrated elsewhere.

With the treatment and knowledge of oceans and seas being fundamental to the creation and resolving of the climate emergency, amongst other environmental problems, we also desperately need the experience of as wide a range of scientists and policy makers as possible. Marine Sciences needs to attract women to study the subject in the first place, and then to retain them as PhD students and early career researchers, so that they become established researchers and lecturers in their own right, to inspire the next generation of young women (and men). And more needs to be done to create an institutional culture which supports caring responsibilities (for both women and men), a healthy home-work balance, and a workplace which is respectful of a diverse workforce. This starts in the classroom.



The material which follows provides a framework to eliminate gender stereotypes, and to create a positive and encouraging working environment for women, as well as men who do not necessarily fit the typical ‘alpha males’ who too often dominate academia. And it provides the justification (should it still be needed) to answer the question why we should all be concerned with gender equality in Marine Sciences. It does so through providing some lively and imaginative examples of teaching that have been used successfully to resonate with female students.



Gender equality in addressing environmental problems has long been recognised as critical: from the UN Conference on Environment and Development and the Beijing Conference on Women in the 1990s and, more recently, by the UN Framework Convention on Climate Change. The Baltic Gender project which underpins this Handbook is grounded in these initiatives. The UN Decade of Ocean Science Research for Sustainability, which begins in 2021, has also identified gender equality as a key to sustainability, so the timing of this handbook on gender-sensitive teaching methods in Marine Sciences could not be more timely.

Prof Susan Buckingham¹



0 | Introduction



Baltic Gender² is an EU-funded project that brings together eight scientific institutions in five countries around the Baltic Sea to work on reducing gender inequalities in Marine Sciences and Technology and more generally in Science, Technology, Engineering and Mathematics (STEM). In its Work Package 4, Baltic Gender aims to develop both methods for conducting gender-sensitive marine research as well as competences and skills in gender-sensitive teaching methods. In this context, Baltic Gender offered both an exploratory workshop with Londa Schiebinger on “Gendered Innovations in Marine Sciences & Technology” in 2018 and two workshops held by Pia Garske on “Gender Equality and Gender-Conscious Teaching in Science” for teaching staff from partner institutions in 2019. The workshops dealt with the question of how the gender issue plays a role in academic teaching in STEM including Marine Sciences & Technology, emphasised the importance of reflecting on one’s own teaching practice and self-awareness, and worked out together with the participants methods and tools for gender-conscious teaching.

Since there are already some well-informative toolboxes for gender-sensitive teaching online, such as those of the EU project Garcia³ or the Freie Universität Berlin,⁴ this brochure focuses on STEM subjects and examples from Marine Sciences or related disciplines. It concentrates on two facets of gender-sensitive teaching, namely „Gender in curricula“ and „Gender-sensitive teaching setups“, in order to sensitise teaching staff in STEM to firstly pay attention to gender differences in the classroom and secondly, to give a number of practical ideas on what they can do if they want to break gender patterns in their direct educational environment.

To illustrate gender in teaching, some concrete examples from teaching practice are embedded in the brochure. Since there is little expertise on gender-sensitive teaching in Marine Sciences, we use examples from Physics as an important reference science. They were elaborated by Helene Götschel, a well-known German physicist, science historian and gender researcher, professor for gender and engineering at the Hannover University of Applied Sciences and Art.



1 | Why is gender important in teaching?

Gender is a constitutive element in organisational structures and disciplinary cultures of science and research since the science system is historically male-dominated. Disciplinary cultures comprise the cultural order, symbolisms and practices of a discipline, dynamic processes, which form values, patterns and behaviours of the members of a discipline and which, furthermore, have an impact on the teaching and learning culture. Prevailing concepts of femininity and masculinity and respective role expectations have been recognised to be the barriers in academic career development for women.

Throughout the world, fewer women than men study science, engineering and technology and, not surprisingly at all, fewer women than men climb to the top of the scientific career ladder, a phenomenon described by the term “leaky pipeline” illustrating the declining proportion of women in science at the various qualification levels and career stages.

Likewise, Marine Sciences and Technology is traditionally a male-dominated field, with a significant lack of women in leadership positions. It is a broad and multidisciplinary field of study concerned with physical, chemical, biological, and geological processes taking place in seas and oceans, but which is also engaged in coastal management, fisheries, ecology, climate change and similar topics.



This means that although there might be technical areas where gender is of no particular relevance, it is an important issue in many other areas of the study field and thus in research content.⁵ Because of the strong ‘research-teaching’ nexus (Neumann 1994)⁶ there is, therefore, a considerable need for competence and skills in gender-sensitive teaching methods for staff in Marine Sciences and Technology and STEM.



Gender-sensitive teaching is concerned with what is taught, how teaching takes place, and how what is taught is learned, in the context of female and male students, as well as with teaching methods and learning materials that take into account the specific learning needs of female and male students. The shared understanding of gender-sensitive teaching in the consortium therefore is that

“Gender sensitive teaching, ..., considers and recognizes the impact of gender aspects in interactions between teaching staff and students as well as among students and in teaching content and material”

(Baltic Consortium on Promoting Gender Equality in Marine Research Organizations 2018, p. 1)⁷

Information Box I

What is meant by 'gender'?

The term 'gender' refers to cultural meanings of masculinity or femininity that influence personal identity, such as socially constructed characteristics, gender roles or behavioural expectations. Gender concepts are socially and historically variable. The assumption that there are only two genders is a powerful social norm that classifies people in (only) two distinguishable, oppositional and complementary categories: females and males, identified as women and men.

Gender binarity is closely interwoven with the norm of heterosexuality, which is considered as natural and normal, according to a logic of reproduction. As a consequence, the sex/gender dichotomy causes social exclusion of people who cannot or do not want to identify themselves in this classification system, such as trans-, inter- or non-binary persons. Furthermore, people with a non-heterosexual orientation are also often affected by discrimination. Gender significantly shapes our perception of social reality and thus has an influence on society, politics, economy and also science.





Take away

Gender-sensitive teaching is concerned with teaching content, materials, methods and the interaction between teachers and students with the aim of offering all students - regardless of their gender - the best possible study conditions so that they can fully develop their individual talents and potential.



2 | Gender in curricula



“Although gender is not visible in Physics at first sight, masculinity and heteronormativity are hidden messages in the teaching and presentation of Physics in the lecture theatre. We need to overcome these demonstrations of normativity to create a safe and welcoming space for all our students. In addition, we have to keep in mind that gender is not the only category of social inequality. Race is another powerful category. The whiteness of Physics shines through in unspoken hierarchies, for example when the geographic latitude is positive in the north, and negative in the south per definition. The whiteness of Physics can be challenged by involving more black physicists and physicists of colour role models in the history and teaching of Physics and by developing an intersectionality-informed Physics education. In fact, a lot can be done to challenge normativity and to enact change in STEM fields.”

Helene Götschel

2.1 GENDER BIAS IN ACADEMIC TEACHING

Although it is important to consider gender in its intersection with other categories of social differentiation, in this brochure the emphasis is on gender as a central differentiating factor that causes social inequality and injustice. Manifold research has shown how, until today, a “hidden curriculum” of prevailing gender-stereotyped perceptions and expectations with regard to women and men in academic teaching impact on students’ attitudes towards learning and engagement with the subject as well as their academic achievements.



Until now, standard teaching methods and learning materials often tend to refer to gender stereotypes when using images that are depicting or portraying women and men. Men are often presented in, for instance, technical contexts, women in more assisting or social and caring activities.



Example 1 from teaching practice challenging masculinity:

“In a task on kinematics developed by one of my colleagues, a lion is chasing after an antelope for a short time and the students are asked to calculate if the antelope will escape or be caught by its hunter. I use this particular example to explain to my students the thinking patterns of Physics. I present the task “Lion hunts antelope” and then show the short film “Lionesses chasing a zebra”. The idea here is to enable the students to see that natural movement patterns such as

acceleration and braking, change of direction as well as the necessary teamwork are being left out and end up as rectilinear and regular movements in the task. Moreover, the students see that lionesses hunt as a team whilst lions do not at all. In this way, the students can question the still prevailing gender ideas of active masculinity and passive femininity that date back to the 19th century.”

Helene Götschel



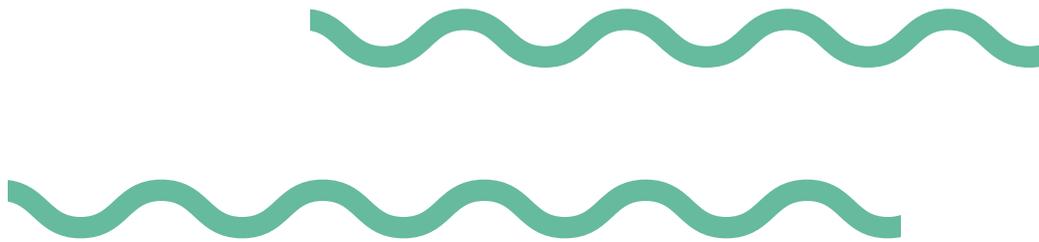
Information Box II

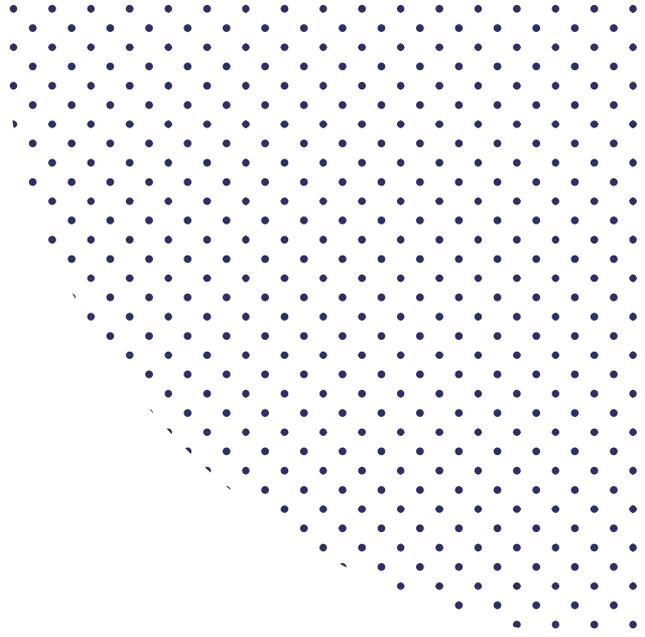
What is meant by a 'gender stereotype'?

"A gender stereotype is a generalised view or preconception about attributes or characteristics, or the roles that are or ought to be possessed by or performed by women and men.

A gender stereotype is harmful when it limits women's and men's capacity to develop their personal abilities, pursue their professional careers and make choices about their lives."⁸

Closely linked to stereotyping is the phenomenon of unconscious bias. “Unconscious biases, otherwise known as implicit biases, are inherent or learned stereotypes about people that everyone forms without realising it. Unconscious biases are social stereotypes about an individual, group or institution. Everyone has unconscious biases about various groups, and they are often not aligned with one’s conscious values.”⁹





Gender bias of lecturers, for example, can be expressed through language that reproduces their personal beliefs and attitudes regarding women and men and the social norms related to their roles and responsibilities¹⁰, which in consequence may lead in the teaching situation among other things to



- ◆ stereotypically assigned work orders
- ◆ different recognition for the same performance
- ◆ unequally distributed confidence and support
- ◆ less frequent integration of women into networks
- ◆ intransparency of processes associated with scientific careers.

2.2 INTEGRATING GENDER IN CURRICULA

“The integration of women’s and gender studies in the curricula of higher education institutions is a core element of a gender-fair conception of study degrees and a crucial factor of scientific development in the reorganisation of academic teaching ...”

(Kortendiek 2011, p. 211)¹¹

The integration of gender issues in curricula is central for academic knowledge building. With regard to the production of knowledge, it is important to disclose androcentric views and gender dichotomies in a scientific discipline (Kortendiek 2011, p. 220).

Information Box III

What is ‘androcentrism’?

The term ‘androcentrism’ describes a view that places the masculine at the centre of thinking and makes it standard. Numerous studies have explored androcentrism in science and its regulating effects on the production and acquisition of knowledge.



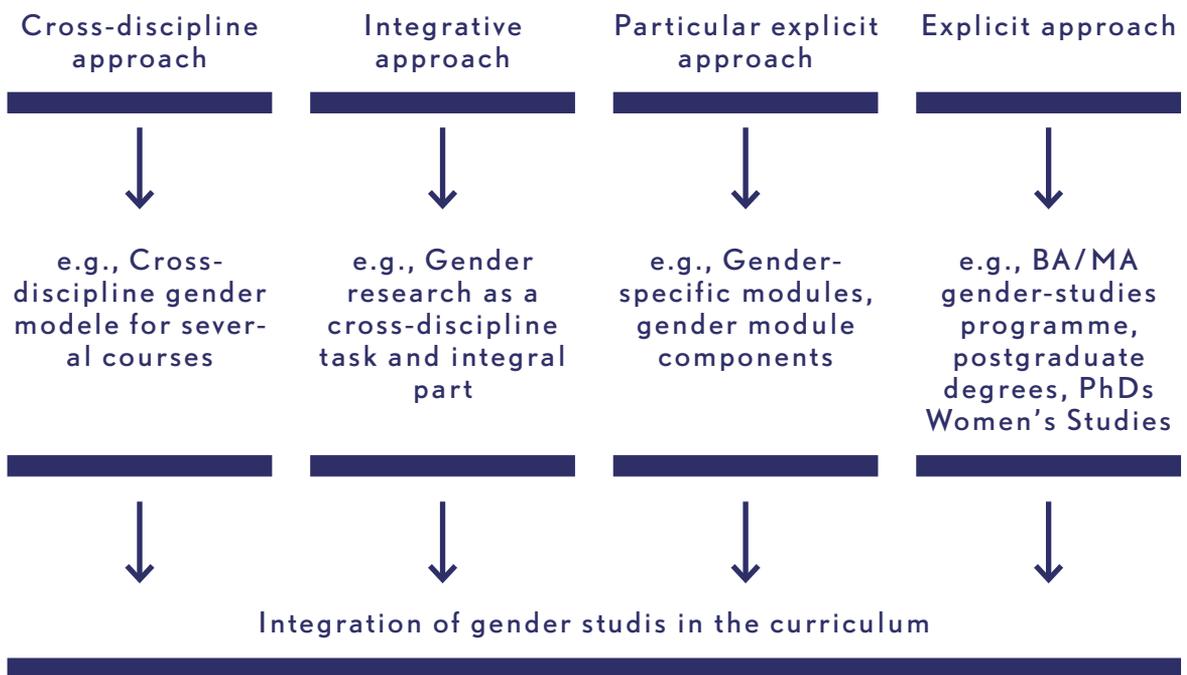
The following examples from research illustrate the relevance of gender in knowledge production:

Research assessing the relationship between temperature and human health provided evidence that women are more vulnerable to heat-related mortality than men and, furthermore, that women have higher risks for ischemic, arrhythmic and blood pressure effects associated with the weather (cf. Guo et al. 2011, p. 6).

Traditionally women have had a significant role in fishing (artisanal, commercial) and in fisherfolk societies (e.g., as female pearl divers or indigenous fisherwomen) and there are various examples of women's contribution in maritime sectors, including in fisheries and marine conservation. Although women play important roles in the entire fishery supply chain world-wide, their roles have been widely overlooked and downplayed (cf. Gissia et al. 2018, p. 216).

A Chinese study on health impacts of air pollution and potential modification by individual characteristics on air pollution effects showed that the cumulative effects were modified by age, gender and educational attainment. Stronger associations between air pollution and mortality were observed in the elderly, females and residents with low educational attainment (cf. Li et al. 2015).

However, according to Kortendiek (2011, p. 226) there is no preset way to anchor gender in studies in higher education; rather, each discipline has to answer this question with regard to its particular context and needs. Kortendiek suggests four forms of how gender aspects can be integrated systematically into teaching and learning.



Source: Kortendiek 2011, p. 223.

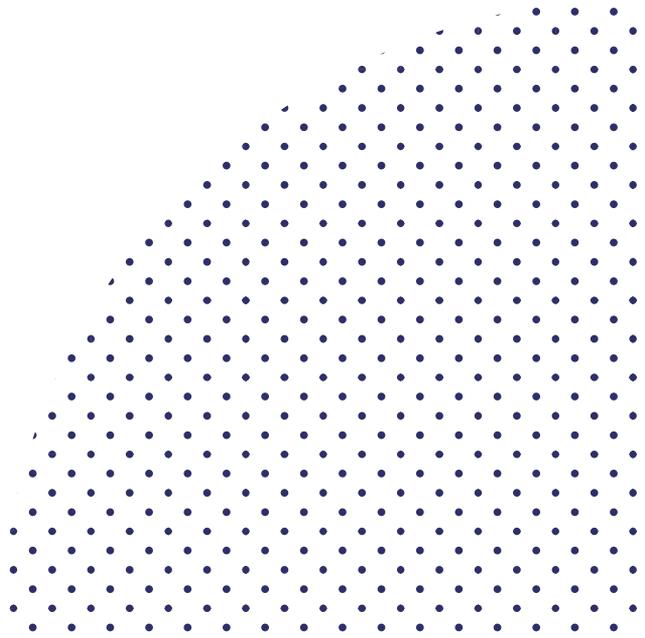


Each of the four approaches is a way of bringing gender aspects into the curriculum. Which one is best suited for an institution depends on underlying conditions in the environment. The two most far-reaching approaches are the integrative approach, which incorporates women and gender aspects as cross-cutting issues into existing fields of study, and the explicit approach, where a specific gender degree programme (BA/MA/doctoral) or postgraduate degree programme is created.

However, to get started at all or in case of small institutions the cross-discipline approach, where a comprehensive gender module for several degree programmes is offered, is useful as well as the particular-explicit approach, where independent modules or module elements are created within a degree programme, e.g., gender aspects in biology or gender in Marine Sciences (cf. Kortendiek 2011, p. 223-226)¹².

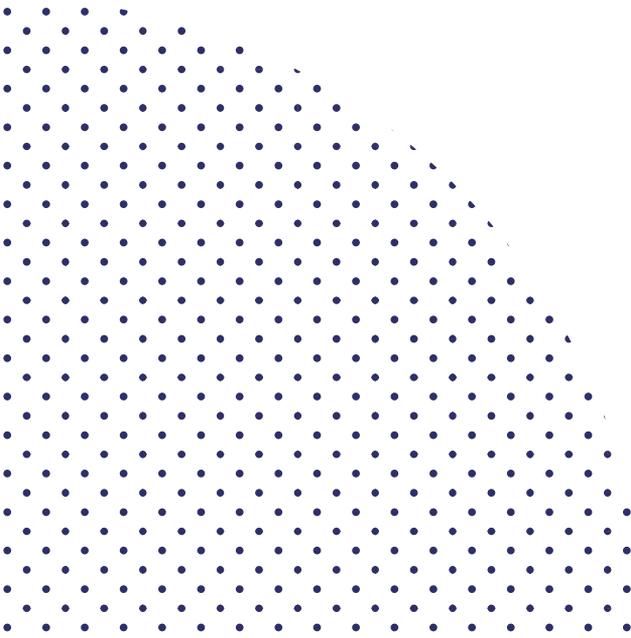


As a best-practice example of how gender contents of (subject-specific) women's and gender studies can be integrated into degree courses, the Women's and Gender Research Network North Rhine-Westphalia developed a model database including proposals for 55 subjects. Scholars from the respective disciplines developed gender curricula that outline (1) general course objectives related to gender issues, (2) subject-specific gender studies content, and (3) concrete forms of integrating gender studies content into the curriculum.¹³





For instance, for Nautical Science course objectives consider among other things aspects such as “Integration and acceptance of women in a formerly male-dominated area”, “The particular situation of women and men working and living together at sea”, or “Interpersonal leadership skills on-board ship”.



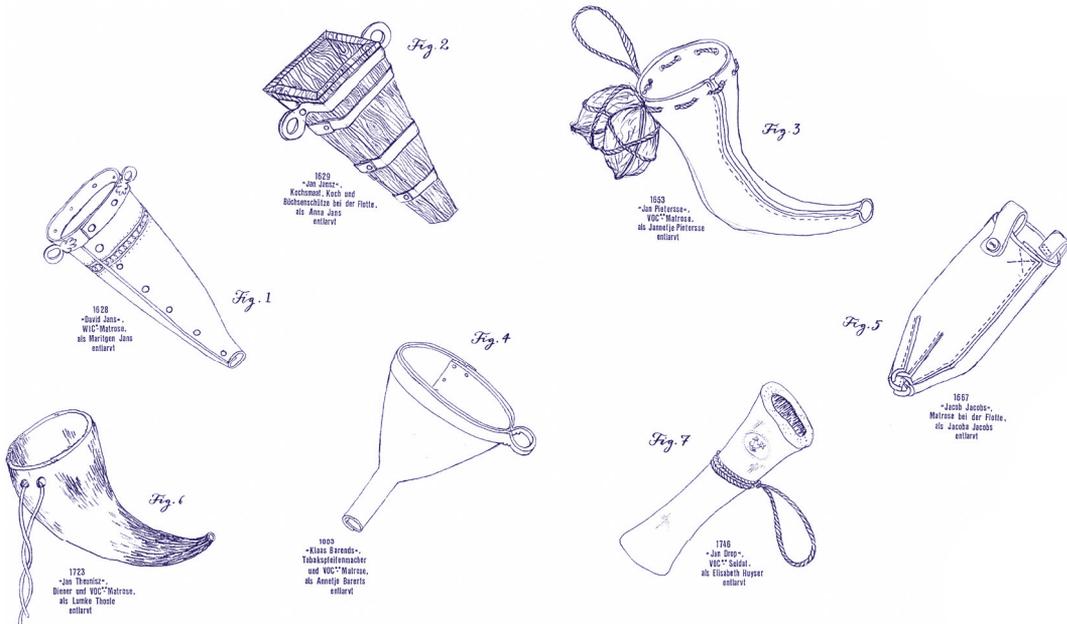
Information Box IV

Women on board in history

Traditionally, women were not wanted on board of a ship; superstition rather saw them as bringing bad luck. However, main captains often took their wives and families along. In the early 20th century few pioneering women even started seafaring trainings; some in boy disguise (cf. Feldkamp 2017).

The illustration below shows seven objects, which women on ships used as pee assistance. They were discovered on board of the West India Company (WIC), the United East India Company (VOC) and the Dutch fleet.

14



It is of utmost importance for a balanced depiction of the performances of women and men that the work and biographies of female researchers be taken into consideration and the issue of female pioneers in (marine) science, such as the first women in Antarctica¹⁵ or female pioneers of seafaring be broached (cf. Feldkamp 2017).¹⁶ Furthermore there have been several outstanding female (activist) scientists that have been pivotal in the field of Science (cf. Gissia et al. 2018), as for instance Eunice Foote, Rachel Carson, or Elisabeth Mann Borgese.



Therefore

- ◆ reflect the alleged objectivity of STEM subjects – who is made visible in the research field of STEM?
- ◆ show that STEM is made by people and not by geniuses – is a theory really invented by one single scientist or was there a whole group who worked on the idea?
- ◆ go beyond the familiar or normal and question what is invisible or concealed.

Information Box V

Women in Oceanography

In 1960, a few women began to join US oceanographic expeditions. In 2005, the journal *Oceanography* published its first volume highlighting the contributions that women have made to Marine Sciences. Ten years later, a new compendium on “Women in Oceanography: A Decade Later”¹⁷ reviews the progress that has been made in addressing career barriers since 2005 as well as areas where further attention might still be needed. The volume also contains about 200 autobiographical sketches of female ocean scientists reflecting on personal views of being a woman in oceanography.





Take away

Gender biases can be minimised or eliminated by the systematic integration of gender aspects and disclosure of inequalities into the curriculum.

- ◆ Find the appropriate approach for incorporating gender aspects into the curriculum; e.g., as cross-cutting issues into existing fields of study, as a specific gender degree programme, as a comprehensive gender module for several degree programmes, as an independent module within a degree programme.
- ◆ Consider women's contributions to the sciences.
- ◆ Reflect on your own internalised gender stereotypes and the unconscious biases you might have about an individual, group or institution. Challenge normative assumptions in your teaching practice to break patterns of thinking.

3 | Gender-sensitive teaching



“As a lecturer in mechanical engineering at a German university of applied sciences, I faced the complex problem of teaching three things concurrently: imparting Physics knowledge, applying gender-related changes of teaching Physics, and reflecting on the teaching approaches. Although gender- and diversity-informed Physics education has not been systematically explored in theoretical and empirical terms, there are a number of exploratory ways – which can work simultaneously at many different levels – to oppose the masculinity of Physics, to look beyond the traditional self-image of Physics, to defy the common ideas about Physics and gender, and to include the personal and professional biographies of women, people of colour, queer people, and other structurally marginalised physicists.”

Helene Götschel



Gender-sensitive teaching requires in addition gender competence, i.e. knowledge about gender stereotyping and discrimination, about gender construction processes, about attitudes and behaviour towards women and men. From a didactics point of view, gender-sensitive teaching aims at equally supporting learning processes of both male and female students.

Two basic didactic principles for gender- and diversity-conscious teaching are method diversity and student activation. Lecturers should pay attention to:

- ◆ gender- & diversity-responsive teaching, language and learning materials.
- ◆ participatory teaching and gender-sensitive classroom dynamics.

3.1 GENDER- & DIVERSITY-RESPONSIVE TEACHING AND LEARNING MATERIALS

Gender-balanced use of imagery and language

In the teaching situation, attention should be paid to the practical examples used, in particular with regard to images, to ensure that they do not contribute to maintaining stereotypes or strengthen the inequality of opportunities through discriminating contents, or women and men not portrayed as having equal value, but instead examples should take up modern or more unusual gender images.¹⁸



Lecturers can examine

- ◆ How many female/male characters are portrayed in the teaching material? Are they equally represented in text and images?
- ◆ How are men and women represented in science? Are female characters also shown in power positions or as engineers?
- ◆ Does the teaching material use gender-inclusive language or does it only refer to generic masculine pronouns?
- ◆ Are students encouraged to think and reflect about the gender dimension in their subject?¹⁹

Example 2 for challenging masculinity and heteronormativity:

“**P**hysics is (re)presented via written texts and oral narratives. This opens up a possibility to intervene during the Physics lecture. The maths problems offer a good chance of challenging traditional perceptions of gender. German textbooks quite often use weapons, sportsmen and male physicists to explain Physics. Therefore, one can challenge gender roles (without further comments) by choosing an allegedly “atypical” sport for the tasks.



For instance, in one of my tasks on calculating the conservation of angular momentum. I replace the usual female ice skater with the male Russian, three-time world champion figure skater Evgeni Plushenko and let my students watch his triple and quadruple jumps and excellent pirouettes. Many of the male mechanical engineering students feel visibly disturbed by Plushenko’s dancing and feminine-looking movements and start snickering.”

Helene Götschel



Sex- and gender-based discrimination starts with language, as the systematic use of gender-biased terminology influences attitudes, behaviour and perceptions and perpetuates a stereotyped view of women's and men's gender roles.²⁰ In order to avoid discriminatory language and to treat all genders equally, numerous guidelines have been developed at national and international level.

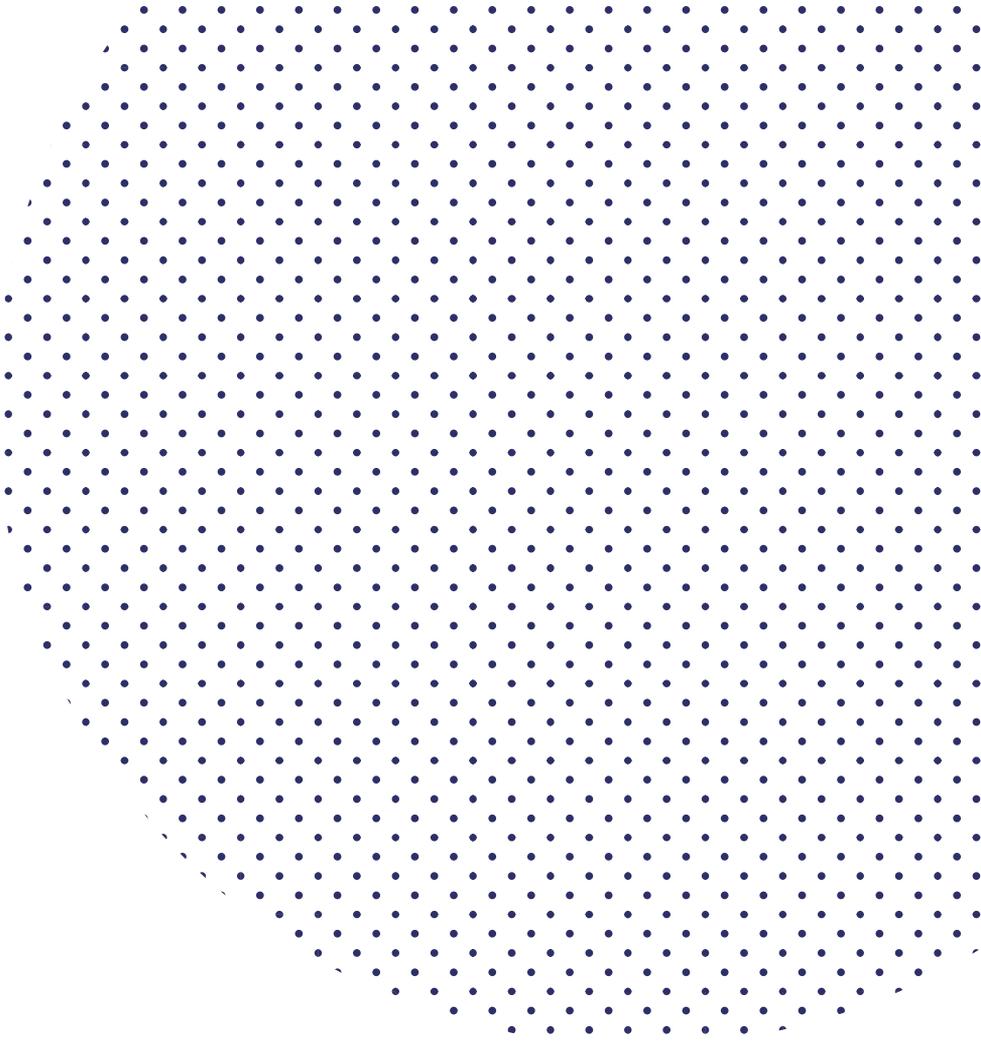
In most languages, the masculine gender is used as the 'inclusive' or 'generic' form, whereas the feminine is 'exclusive', i.e. referring to women only. This generic or neutralising use of the masculine gender has often been perceived as discriminating against women. Therefore, neutral and inclusive alternatives should be sought (cf. EU Parliament 2018)²¹, as the following examples show:²²

gendered noun		gender-neutral noun
man	→	person / individual
freshman	→	first-year student
mankind	→	people / human beings
man-made	→	machine-made
chairman	→	chair, chairperson
policeman	→	police officer

Information Box VI

What is 'gender-neutral language'?

“Gender-neutral language is a generic term covering the use of non-sexist language, inclusive language or gender-fair language. The purpose of gender-neutral language is to avoid word choices which may be interpreted as biased, discriminatory or demeaning by implying that one sex or social gender is the norm. Using gender-fair and inclusive language also helps reduce gender stereotyping, promotes social change and contributes to achieving gender equality” (EU Parliament 2018, p.3).



Take away

Standard teaching materials tend to use gender stereotypes; instead, use gender-balanced images and gender-neutral language.

In terms of diversity aspects in contents and materials, lecturers should check whether diversity categories such as gender, age, disability, ethnicity/race, social origin, religion/belief and sexual orientation are explicitly addressed, or whether examples are selected that represent the diversity of people.

3.2 PARTICIPATORY TEACHING

“It depends only on the lecturer, his [or her] professional and pedagogical knowledge, skills, experience and creativity to find space for the implementation of participatory methods in the context of teaching his [her] subjects”

²³
(Kucharčíková/ Tokarjčíková 2016, p.89)

The main principle and objective of participatory teaching is active student participation. Higher motivation and interest in the subject as well as better efficacy and results can be achieved by applying a variety of methods instead of just frontal teaching.

By using a variety of methods, it is also more likely that different learning types/learning styles will be accommodated.



Examples for a variety of teaching methods

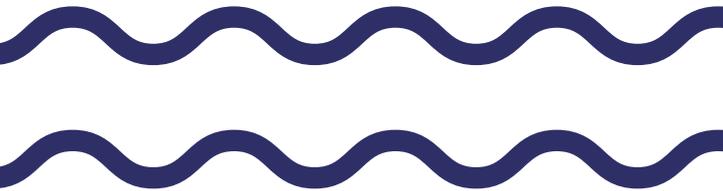
Lecture	Seminar	Lab
Group work	Group work	Group work
Interactive lecture (videos, etc.)	Project-based learning	Project-based learning
Showing different approaches, images	Think-pair-share	Learning diary
Video analysis	Roleplay simulations	Excursions
Powerpoint presentation	Debating club	Work placements
	Field trips	

Example 3 from teaching practice for the conservation of the angular momentum:

“**T**he next term, I had the opportunity to modify the experiment of the conservation of the angular momentum. Typically, a person sits on a rotating stool chair and is being turned round while holding a heavy dumbbell in each hand. With both arms stretched out in a horizontal line, the moment of inertia grows and the angular acceleration of the rotation slows down. Keeping the weights close to the body, the mass moment of inertia decreases and the angular acceleration increases. We can observe this effect with figure-skating pirouettes or the somersaults performed by gymnasts and high divers. Instead of the usual call for a ‘strong male student’, I invited all students to participate in the demonstration. One female student took part on the condition that she had to hold only one dumbbell in her

hands. We observed that the intended effect would also show with only one weight held in both hands. Consequently, I will carry out this experiment in future with only one dumbbell. In this way, all students have a fair chance to participate in the experiment: those who would otherwise feel embarrassed when asking for a ‘lighter’ variant of the experiment in front of the whole group as well as those who would refrain from taking part, believing they lacked the necessary physical strength. Such a change in the material-discursive choreography of student, teacher, dumbbell, rotating stool and audience could turn the usually externally oriented demonstration of masculine strength into an internally oriented bodily experience of the rather difficult-to-grasp concept of angular momentum.”

Helene Götschel



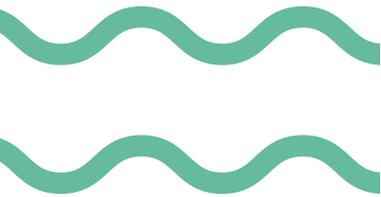
Take away

Make sure that you use a variety of media and stimuli: switch between more cognitive and more practice-oriented approaches so that what students have learned can be tested, criticised and linked. If possible, ensure a physical presence of the object of investigation – if necessary, also as a digital artefact.²⁴

PROJECT-BASED LEARNING

Project-based learning refers to any programmatic or instructional approach that utilises multifaceted projects as a central organising strategy for educating students. When engaged in project-based learning, students will typically be assigned a project or series of projects that require them to use diverse skills – such as researching, writing, interviewing, collaborating, or public speaking – to produce various work products, such as

research papers, scientific studies, public-policy proposals, multimedia presentations, video documentaries, art installations, or musical and theatrical performances. Unlike many tests, homework assignments, and other more traditional forms of academic coursework, the execution and completion of a project may take several weeks or months, or it may even unfold over the course of a semester or year.²⁵



Projects provide the context for experiential learning and skills such as collaborative creativity, problem-solving and decision-making.²⁶ An alumni survey conducted by the Worcester Polytechnic Institute showed that learning outcomes of project-based learning were even more pronounced for women, who appeared to gain more for their personal and professional development than their fellow male students.²⁷

Take away

There is evidence that a project-based curriculum may boost female success in the fields of science, technology, mathematics and engineering. In general, it can be said that project-oriented learning, in contrast to frontal teaching, contributes to better learning outcomes for all students, regardless of sex or gender.

Example 4 from teaching practice on Newton's Third Law:

“**P**hysics is performed through experiments in the lecture theatre. Interdisciplinary gender research in general and also pedagogical and educational research study physical objects and their meaning for knowledge production and teaching. To physically experience Newton's Third Law of Motion, also called the law of interaction, two students face each other standing on two skateboards, each of them holding one end of a rope.

It does not matter if one student or the other or both students pull at the rope; the skateboards move towards one another exactly as formulated by the law of interaction.



Whenever I enact this experiment with my first-semester students, patterns of gender inequality and heteronormativity are (re)presented in the lecture theatre. Once when the experiment was repeated, ‘by chance’ a slim female participant had replaced a stout male student.

As before, the two skateboards moved towards each other, no matter who pulled on the rope. However, since the slim woman was lighter than her corpulent predecessor, her skateboard accelerated faster than in the previous experiment – according to Newton's Laws.

Observing this, a male student noted, 'They are in love with each other!' and all the students burst out laughing. Two skateboards, a rope, two students and one member of the audience played out a material-discursive choreography, which produced a binary gender order and heterosexual desire in the theatre. In this performative act, the female student was put in her place 'as the other side of Physics'.

Assuming that the resulting material-discursive choreography which had gendered the lecture theatre in a binary, heterosexual way would make it harder for the few female students to participate in future experiments, I addressed the issue in the following lecture.

I pointed out that every student should enjoy participating in the experiments and that no one should mar the experience with gendering or racialising remarks and jokes. Moreover, since we do not know anything about the participants' sexual orientation and because this type of personal information is in no way relevant to Physics, I clearly condemned any form of heterosexuality implying comments about other participants."

Helene Götschel

ADAPTING TO PARTICIPANTS

In general, lecturers tend to have certain – conscious or unconscious – assumptions about their students which influence their teaching interactions. To become aware of these assumptions can contribute to a gender-friendly and inclusive atmosphere and the greater success of the course.

Each lecturer should therefore reflect his or her beliefs, showing that he or she takes students seriously with regard to their individual learning needs and their different biographies, which may be affected by social inequalities affecting, in turn, their daily lives.²⁸

The interaction between a lecturer and the students is crucial for gender equality in the classroom. The following recommendations are selected from a presentation given by USAID:²⁹

Key skills demonstrated by lecturers

- ◆ Valuing equally the learning ability of both female and male students.
- ◆ Reacting cautiously to unfriendly and potentially gender-biased attitudes that students may demonstrate toward their female and male peers.
- ◆ Looking for characteristics/behaviours resulting from social norms that may hinder academic learning and performance (e.g. shyness, arrogance, dominance, bullying, lack of confidence, or fear of speaking out in class).



Dynamics and interaction in teaching

- ◆ Giving equal chances to all students to answer questions.
 - ◆ Ensuring that everyone is heard and every comment is valued.
 - ◆ Ensuring that working groups are gender-mixed
 - ◆ Ensuring that group leaders are gender-mixed.
 - ◆ Encouraging all students of all genders to present results equally from group work.
 - ◆ Ensuring that students do not dominate over others.
 - ◆ Assigning similar duties regardless of traditional gender roles (for example, cleaning, moving furniture).
 - ◆ Discouraging gender-discriminatory and sexist behaviours. All acts of severe sexual harassment and assault must be punished.
- 



Take away

- ◆ Participatory teaching invites the use of cooperative and interactive methods instead of just frontal teaching. Make sure that you use a variety of media and stimuli: switch between more cognitive and more practice-oriented approaches so that what students have learned can sink in through reflection, feedback and repetition.
 - ◆ There is evidence that a project-based learning curriculum may boost female success in STEM fields. In general, it can be said that project-based learning contributes to better learning outcomes for all students regardless of their gender. It gives students the opportunity to develop knowledge and skills through challenges and problems they may face in the real world.
 - ◆ Inclusive teaching requires the lecturer(s) to adapt to students' individual biographies and learning needs, thereby taking the changing needs of different student groups into account.
- 

4 | Checklist from all “Take aways”

- ◆ Gender-sensitive teaching is concerned with teaching content, materials, methods and the interaction between teachers and students with the aim of offering all students - regardless of their gender - the best possible study conditions so that they can fully develop their individual talents and potential.
- ◆ Gender biases can be minimised or eliminated by the systematic integration of gender aspects and disclosure of inequalities into the curriculum.
- ◆ Find the appropriate approach for incorporating gender aspects into the curriculum; e.g., as cross-cutting issues into existing fields of study, as a specific gender degree programme, as a comprehensive gender module for several degree programmes, as an independent module within a degree programme.
- ◆ Consider women’s contributions to the sciences.
- ◆ Reflect your own gender stereotypes and try to challenge normative assumptions.
- ◆ Standard teaching materials tend to use gender stereotypes; instead, use gender-balanced images and gender-neutral language.
- ◆ In terms of diversity aspects in contents and materials, lecturers should check whether diversity categories such as gender, age, disability, ethnicity/race, social origin,



religion/belief and sexual orientation are explicitly addressed, or whether examples are selected that represent the diversity of people.

- ◆ Make sure that you use a variety of media and stimuli: switch between more cognitive and more practice-oriented approaches so that what students have learned can be tested, criticised and linked.
- ◆ There is evidence that a project-based curriculum may boost female success in STEM fields. In general, it can be said that project-oriented learning contributes to better learning outcomes for all students regardless of their gender. It gives students the opportunity to develop knowledge and skills through challenges and problems they may face in the real world.
- ◆ Participatory teaching invites the use of cooperative and interactive methods instead of just frontal teaching.
- ◆ Make sure that you use a variety of media and stimuli: switch between more cognitive and more practice-oriented approaches so that what students have learned can sink in through reflection, feedback and repetition.
- ◆ Inclusive teaching requires the lecturer(s) to adapt to students' individual biographies and learning needs, and thereby to take the changing needs of different student groups into account.

ENDNOTES

- 1 Professor Susan Buckingham is Advisor to the Baltic Gender Project, and Gender Advisor to the ‘Empowering Women for the United Nations Decade of Ocean Science for Sustainable Development’ research program at the World Maritime University.
- 2 The Baltic Gender project is funded from 2016 to 2020 by the HORIZON 2020 program under the call for promoting “Gender Equality in Research and Innovation” and the topic of “Support to research organisations to implement gender equality plans” (GERI-4-2015); cf. <https://www.baltic-gender.eu/de>
- 3 “Toolkit for Integrating Gender-Sensitive Approach into Research and Teaching” available at: http://garciaproject.eu/wp-content/uploads/2015/12/GARCIA_working_paper_6.pdf [3 March 2020].
- 4 “Toolbox Gender and Diversity in Teaching” available at: <https://www.genderdiversitylehre.fu-berlin.de/en/toolbox/index.html> [3 March 2020].
- 5 Cf. Gendered Innovations <http://genderedinnovations.stanford.edu/index.html> [2 March 2020].
- 6 Neuman, Ruth (1994). The research-teaching nexus: applying a framework to university students’ learning experiences, *European Journal of Education*, 29(3), 323-339.
- 7 “Tools and Resources on Gender-Sensitive Teaching Methods in Higher Education” available at: http://oceanrep.geomar.de/41854/1/Online%20Material_final_2019.pdf [4 March 2020].

- 8** “What is unconscious bias?” available at <https://learn.g2.com/unconscious-bias> [2 March 2020].
- 9** “Introduction to gender-responsive teaching methods” available at: https://www.mcsprogram.org/wp-content/uploads/dlm_uploads/2018/11/PowerPoint-Introduction-to-Gender-Responsive-Teaching-Methods.pdf [2 March 2020].
- 10** “Gender stereotyping” available at: <https://www.ohchr.org/en/issues/women/wrgs/pages/genderstereotypes.aspx> [2 March 2020].
- 11** Kortendiek, Beate (2011). Supporting the Bologna Process by gender mainstreaming: a model for the integration of gender studies in higher education curricula. In: Laura Grünberg (ed.), From gender studies to gender in studies. Case studies on gender-inclusive curriculum in higher education, CEPES European Centre for Higher Education, Bukarest, pp. 211-228.
- 12** “Implementation options” gives various examples of layers at which gender and diversity can be anchored in teaching, available at: <https://www.genderdiversitylehre.fu-berlin.de/en/toolbox/teaching-and-study-content/implementation-options/index.html> [2 March 2020].
- 13** “Gender curricula for Bachelor and Master” available at: http://www.gender-curricula.com/no_cache/en/gender-curricula/ [3 March 2020].
- 14** By kind permission of Marei Schweitzer, Die Enzyklopädie der Frauen der Meere, illustrated broadsheet no. 6, screen printing. Available at: <http://www.frauendermeere.de/bilderbogen6.php>

- 15** “The first women in Antarctica” available at <https://ocean-wide-expeditions.com/blog/the-first-woman-and-female-scientists-in-antarctica>; “Women in Antarctica” available at: https://en.wikipedia.org/wiki/Timeline_of_women_in_Antarctica [2 March 2020].
- 16** Feldkamp, Ursula (2017). Eine unstillbare Sehnsucht, Kultur und Technik, 3, 14-18.
- 17** Kappel, Ellen S. (Ed.) (2014). Women in Oceanography: A Decade Later. Oceanography, 27(4), Supplement.
- 18** For more information see: “Gender-sensitive communication in research and academia: the SUPERA guidelines” available at: <https://www.superaproject.eu/gender-sensitive-communication-in-research-and-academia-the-supera-guidelines/> [25 May 2020].
- 19** “Toolkit for integrating a gender-sensitive approach into research and teaching” available at: https://eige.europa.eu/sites/default/files/garcia_working_paper_6_toolkit_integrating_gender_research_teaching.pdf [2 March 2020].
- 20** Cf. “Gender-sensitive language” available at: <https://eige.europa.eu/thesaurus/terms/1215> [2 March 2020].
- 21** “Gender-neutral language in the European parliament” available at: https://www.europarl.europa.eu/cmsdata/151780/GNL_Guidelines_EN.pdf [3 March 2020].
- 22** Cf. “Gender-sensitive language: What is gender-sensitive language and why should I use it?” available at: <https://www.mtu.edu/policy/development/how-to/19-gender-sensitive-language.pdf> [2 March 2020].

- 23** Kucharčíková, Alžbeta; Tokarčíková, Emese (2016). Use of participatory research methods in teaching at the university, *The Online Journal of Science and Technology* 6(1), 82-90.
- 24** Cf. “Variety of methods” available at: https://www.genderdiversitylehre.fu-berlin.de/en/toolbox/teaching-methods/didactic-principles/_inhaltselemente/variety/index.html [2 March 2020].
- 25** “Project-based learning” available at: <https://www.edutopia.org/project-based-learning> [3 March 2020].
- 26** The University of Groningen requires students to work on interdisciplinary projects throughout their Bachelor studies, see: <https://www.rug.nl/ucg/education/projects/> [2 March 2020].
- 27** “Strategy for women in STEM” available at: <https://www.insidehighered.com/news/2013/11/20/project-based-learning-could-help-attract-and-retain-women-stem-study-suggests> [2 March 2020].
- 28** “Adapting to participants” available at: https://www.genderdiversitylehre.fu-berlin.de/en/toolbox/teaching-skills/guidelines/_inhalte/Guidelines-FAQ/participants.html [2 March 2020].
- 29** “Introduction to gender-responsive teaching methods” available at: https://www.mcsprogram.org/wp-content/uploads/dlm_uploads/2018/11/PowerPoint-Introduction-to-Gender-Responsive-Teaching-Methods.pdf [2 March 2020].



SOURCES

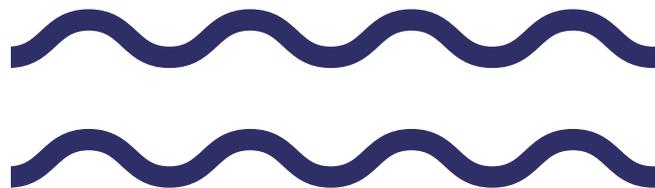
- ◆ Baltic Gender Consortium on Promoting Gender Equality in Marine Research Organizations (2018). Tools and Resources on Gender-Sensitive Teaching Methods in Higher Education; available at: http://oceanrep.geomar.de/41854/1/Online%20Material_final_2019.pdf; [4 March 2020].
- ◆ Ebenfeld, Melanie (2017). Checklist for gender- and diversity conscious didactics. In: Freie Universität Berlin. Toolbox Gender und Diversity in der Lehre; available at: https://www.genderdiversitylehre.fu-berlin.de/toolbox/_content/pdf/methods_checklist1.pdf [2 March 2020].
- ◆ European Institute for Gender Equality (EIGE) (no year). Gender-sensitive language; available at: <https://eige.europa.eu/thesaurus/terms/1215> [2 March 2020].
- ◆ European Parliament (2018). Gender-neutral language in the European parliament; available at: https://www.europarl.europa.eu/cmsdata/151780/GNL_Guidelines_EN.pdf [3 March 2020].
- ◆ Feldkamp, Ursula (2017). Eine unstillbare Sehnsucht, Kultur und Technik, 3, 14-18.
- ◆ Freie Universität Berlin (2018). Toolbox Gender and Diversity in Teaching; available at: <https://www.genderdiversitylehre.fu-berlin.de/en/toolbox/index.html> [21 February 2020].
- ◆ Grasgreen, Allie (2013). Strategy for women in STEM. In: Inside Higher ED; available at: <https://www.insidehighered.com/news/2013/11/20/project-based-learning-could-help-attract-and-retain-women-stem-study-suggests>; [2 March 2020].

- ◆ Kappel, Ellen S. (Ed.) (2014). Women in Oceanography: A Decade Later. *Oceanography*, 27(4), Supplement; available at: <https://tos.org/oceanography/article/introduction-to-women-in-oceanography-a-decade-later> [2 February 2020].
- ◆ Kortendiek, Beate (2011). Supporting the Bologna Process by gender mainstreaming: a model for the integration of gender studies in higher education curricula. In: Laura Grünberg (ed.), *From gender studies to gender in studies. Case studies on gender-inclusive curriculum in higher education*, CEPES European Centre for Higher Education, Bukarest, pp. 211-228.
- ◆ Kucharčíková, Alžbeta; Tokarjčíková, Emese (2016). Use of participatory research methods in teaching at the university, *The Online Journal of Science and Technology*, 6(1), 82-90.
- ◆ McCarthy, John (no year). Project-based learning. 3 Common PBL Problems—and Solutions. Ideas for how to overcome issues that teachers new to project-based learning frequently encounter; available at: <https://www.edutopia.org/project-based-learning>; [3 March 2020].
- ◆ Michigan Technology University (no year). Gender-sensitive language: What is gender-sensitive language and why should I use it?; available at: <https://www.mtu.edu/policy/development/how-to/19-gender-sensitive-language.pdf>; [2 March 2020].



- ◆ Mihajlović Trbovc, Jovana; Hofman, Ana (2015). Toolkit for Integrating a Gender-Sensitive Approach into Research and Teaching. GARCIA Working Papers 6; available at: http://garciaproject.eu/wp-content/uploads/2015/12/GARCIA_working_paper_6.pdf; [2 March 2020]
- ◆ Moran, Courtney (2019). What is Unconscious Bias (+How to Avoid It in the Workplace?); available at: <https://learn.g2.com/unconscious-bias>; [2 March 2020].
- ◆ Neuman, Ruth (1994). The research-teaching nexus: applying a framework to university students' learning experiences, *European Journal of Education*, 29(3), 323-339.
- ◆ Oceanwide Expeditions (no year). The first women in Antarctica; available at <https://oceanwide-expeditions.com/blog/the-first-woman-and-female-scientists-in-antarctica>; [2 March 2020].
- ◆ Schiebinger, Londa, Klinge, Ineke, Sánchez de Madariaga, Inés, Paik, Hye-Young, Schraudner, Martina, and Stefanick, Marcia (Eds.) (2011-2018). *Gendered Innovations in Science, Health & Medicine, Engineering and Environment*; available at: <http://genderedinnovations.stanford.edu/index.html> [2 March 2020].
- ◆ United Nations HUMAN RIGHTS Office of the High Commissioner (no year). Gender stereotyping; available at: <https://www.ohchr.org/en/issues/women/wrgs/pages/genderstereotypes.aspx>; [2 March 2020].

- ◆ University of Groningen (no year). Project-Based Learning; available at: <https://www.rug.nl/ucg/education/projects/>; [2 March 2020].
- ◆ USAID (2018). Introduction to Gender-Responsive Teaching Methods; available at: https://www.mcsprogram.org/wp-content/uploads/dlm_uploads/2018/11/PowerPoint-Introduction-to-Gender-Responsive-Teaching-Methods.pdf [2 March 2020].
- ◆ The Women's & Gender Research Network NRW (no year). Gender curricula for Bachelor and Master; available at: http://www.gender-curricula.com/no_cache/en/gender-curricula/; [3 March 2020].



BALTIC GENDER CONSORTIUM



Geomar Helmholtz Centre
for Ocean Research Kiel,
Germany



Estonian Marine Institute,
University of Tartu,
Estonia



Christian-Albrechts-University Kiel,
Germany



Kiel University of Applied Sciences,
Germany



LUND UNIVERSITY

Lund University,
Sweden



KLAIPĖDA
UNIVERSITY

Klaipėda University,
Lithuania



Finnish Environment Institute,
Finland



The Leibniz Institute
for Baltic Sea Research Warnemünde,
Germany

Authors

Dr Britta Thege
Dr Marike Schmeck
Mareike van Elsacker

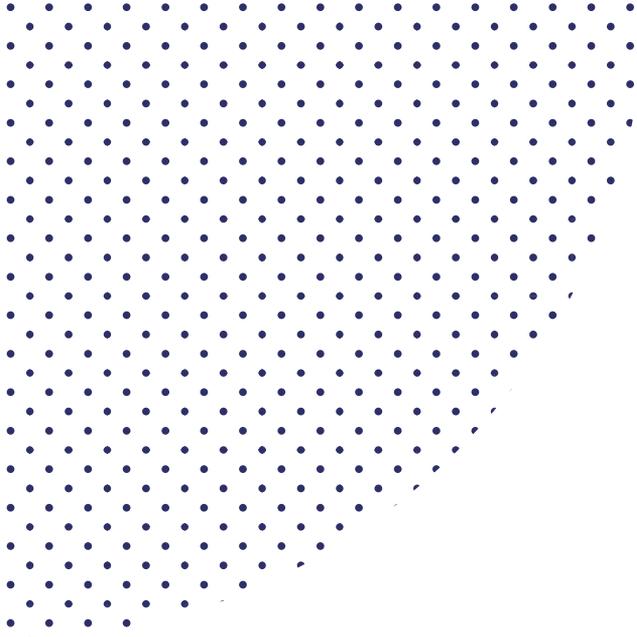


Sokratesplatz 1
24149 Kiel
Germany

www.baltic-gender.eu

Layout

Mathias Foot
www.mathiasfoot.com
@monsieur.pied



This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No. 710633

