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Engineering: Education and Innovation

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2021

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## INTEGRATING GENDER AND INCLUSIVITY INTO RESEARCH PLANNING

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**Conference Key Areas:** *Gender, diversity and inclusiveness*

**Keywords:** *Gender equality, Gender-sensitive research, Gender-sensitive teaching, Toolkit*

### ABSTRACT

Attaining equity across genders is still a challenging concept in many facets of society, but successful engineering for a diverse population requires inclusivity. Engineering teams, engineering design processes, engineering research and output can all improve when gender is considered, and when principles of inclusivity and equality are applied. Gender equality training, guided by research-informed toolkits, can promote positive actions, and encourage institutional change. This paper reports the outcomes of a workshop offered at the 2021 SEFI conference, introducing participants and readers alike to a toolkit for integrating gender-sensitive approaches into research and teaching. The toolkit, developed by Mihajlović Trbovc and Hofman, helps academics integrate gender dimensions into their research and teaching – at undergraduate, graduate and doctoral levels – and into new projects and curricula.

### 1 INTRODUCTION

Gender equality is one of the core values of the European Union and is embedded in the 5<sup>th</sup> Sustainable Development Goal in the United Nations' 2030 Agenda for Sustainable Development. Promoting gender equality and diversity in science has been also one of the six priorities in strengthening the European Research Area. Achieving equality across genders, while addressing their diversity, is still challenging in many domains of our societies, and it is particularly crucial in engineering for a diverse population. To progress gender equality, the European

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Commission has been supporting implementation of actions in universities and research centres to promote equality and to dismantle gender stereotypes. Gender equality training, guided by research-informed toolkits like the one by Mihajlović Trbovc and Hofman [1], can promote positive actions, and encourage institutional change. This paper introduces readers to the toolkit, its purpose, and some of its core features, and it reports the outcomes of a workshop offered at the 2021 SEFI (European Society for Engineering Education) conference designed to help participants apply the toolkit to better integrate gender-sensitive approaches into their research and teaching.

## 2 INTRODUCTION TO THE TOOLKIT

The toolkit discussed at this workshop presents four steps to integrating gender-sensitivity into one's academic work. It involves: (1) designing gender-sensitive research content; (2) applying gender-sensitive methodology; (3) producing gender-sensitive results; and (4) achieving gender-sensitive outcomes in the teaching process. It was developed by Jovana Mihajlović Trbovc and Ana Hofman, via a project funded by the European Commission: "Gendering the Academy and Research: combating Career Instability and Asymmetries" (GARCIA, [www.garciaproject.eu](http://www.garciaproject.eu)). Its purpose is to help academics envision and enact more inclusive projects and curricula by integrating gender dimension into various aspects of research and into teaching at undergraduate, postgraduate, and doctoral levels.

Gender-sensitive research considers gender as a variable in all steps of a research project while striving for equitable participation in research among genders (male, female, transgender, transsexual, etc.). It helps make research results more relevant for society. Using a gender-sensitive approach encourages researchers to consider and utilize more sensitive research methodologies in general—and the process of considering gender may open new interdisciplinary research questions. It can enable researchers to write more competitive research and funding proposals. Integrating gender sensitivity into one's research conduct also tends to build a more gender-sensitive academic work environment overall [1].

The research approach considers gender differences—such as how men and women might be differently affected—at all stages of the research process from conception to communication of results. Gender differences, which often lie under the surface and remain unrecognized and unnamed, but they need to be considered and this toolkit helps researchers think about what, when, and how to probe such issues.

Gender-sensitive teaching considers and supports students of all genders, integrating more diverse histories, voices and perspectives into course material and discussions. Gender needs to be considered with regard to class conduct and class content, with inclusion of readings and publications that use a gender-sensitive approach and homework assignments that require reflection on the gender-dimensions of a subject. It is important to provide equal opportunity to staff of all genders across disciplines, attract and retain diverse students and teachers.

### 3 OVERVIEW OF THE WORKSHOP

Most participants in this SEFI event engage daily in both teaching and research. To support equity, our workshop at SEFI aimed to help these engineering educator/researchers reflect on ways gender is relevant to their research projects as well as their teaching practices. Workshop participants practiced applying the toolkit under three scenarios:

1. Designing gender-sensitive research/curriculum content
2. Applying a gender-sensitive theoretical or methodological structure
3. Producing gender-sensitive outcomes

The workshop was opened by the session coordinator, Professor Shannon Chance, and the Chair of SEFI's Special Interest Group (SIG) on Gender and Diversity, Dr. Inês Direito. Their welcome was followed by a presentation of the toolkit by its lead author, Dr. Jovana Mihajlović Trbovc. Then the attendees broke into small groups to apply and practice using the toolkit, using Google Jamboard (<https://jamboard.google.com/>) as a collaborative tool to generate and capture ideas for subsequent discussion. The workshop culminated with a response by Dr. Mihajlović Trbovc to comments posted to the Jamboards. In this way, Dr. Mihajlović Trbovc provided a re-cap of the individual group outputs, extending our understandings with practical suggestions for engineering education research.

## 2 RESULTS

The breakout groups in this workshop focused on three specific aspects of the toolkit: (1) how to design gender-sensitive research content; (2) how to detect stereotypes and biases; and (3) how to apply gender-sensitive theoretical or methodological structures. Regarding each topic, workshop participants generated new ideas and insights specifically relevant to engineering education research. Below, we integrate ideas from the toolkit and view these in relation to engineering education research and practice. Ideas presented below therefore originate from two sources: (a) the toolkit itself and (b) annotations made on to pages of the toolkit by workshop participants using Google Jamboard.

### 2.1 How to design gender-sensitive research content

The question of how to design gender-sensitive research content is step one of the toolkit, and it has to do with identifying the research question and generating research questions that are gender-sensitive. This step requires considering gender dimensions throughout each planned phase of the research (posing the initial idea, formulating the research question, designing aims and objectives of the research, applying methodologies, and presenting outcomes and results). The toolkit provides valuable prompts, such as: Can you formulate the research question with both women and men in mind? Can you think of how men and women relate differently to the research question? Does your project have to do with structural aspects of society, such as decision-making, law and public policy? It's important to consider



how the roles and positions of women and men differ in the realm you're studying and if genders are equally represented in various aspects—such as decision-making, access (e.g., transportation, mobility, use of infrastructure), income, and ownership (e.g., property, land).

The toolkit recommends that, “if your project tackles the private lives of individuals, think of how women experience life situations differently from men” [1, p.30]. Be aware that women and men can face different challenges (related to, for instance, voting, parenting, consumption, career paths) and consider how this might influence your results and findings. Are participants in your study influenced by their society's dominant roles and narratives, pressures and expectations—in the way they think, behave and respond to questions?

As the default lens often ignores gender, such prompts are important in helping us see, name, and address what normally remains invisible. But are they applicable in all research disciplines? We think they are applicable at some level in nearly all research, and we challenge you, the reader to probe this as carefully as possible. For centuries researchers have assumed their research was gender-neutral, and this has had detrimental, and very often measurable, results [2]. Consider how many women have died while driving over-medicated because dosing was designed with larger, male-sized bodies in mind, and how many more have died in vehicular accidents because car safety belts were designed without regard to women's typical body sizes and types. From cell behaviour to the design of ingredients, products, buildings, and infrastructure, gender makes a difference. At all these levels, women have historically been ignored, which resulted in them being treated as 'atypical' or 'inferior' [3]. Even apps to track health have omitted basic health issues faced by all women. Revealing a huge blind spot, Apple released a health tracking that had no capacity for tracking menstrual cycles. The toolkit helps researchers avoid such omissions. It urges us to consider, when defining research problems, the way male and female bodies and chemistries might differ. It advises that, when reviewing literature, we take time to search for gender-sensitive studies and literature related to the study topic and assess where gender aspects might remain implicit.

Workshop participants who looked specifically at this step noted we should take care not to inadvertently attribute women's (interview or survey) responses to their gender. Participants agreed it is important to adopt a gender lens, and to also be mindful of the non-binary gender spectrum—being careful not to force people into boxes, particularly boxes that do not actually fit their identities. They recommended extending the toolkit in the future to include class and other aspects of intersectionality—to help researchers consider additional issues related to equity, including ethnicity, nationality, class, physical ableness, etc.

## **2.2 How to detect gender stereotypes, inequities, and biases**

Participants noted that we should be careful not to introduce stereotypes when considering gender dimensions, or at least carefully consider how conscious and unconscious biases might influence our own assumptions. This topic was the

primary focus of the second breakout group, on detecting gender stereotypes, inequalities, and biases.

The toolkit recommends that while considering gender aspects in your research, individuals ask if they might be “projecting stereotypical roles onto how men and women behave, what they need and desire” and consider repeatedly if there are hidden aspects related to gender and stereotyping that might be inadvertently embedded in your research questions or objectives [1, p.32].

Related to teaching, what do you do to raise students’ awareness of gender stereotypes in engineering, and inequities they might face as professional engineers? As engineering remains a male-dominated profession, for attendants of the SEFI workshop particular question from the toolkit was quite relevant: “have you considered how your female students feel about [the] professional scene they are entering?” And vice versa, we should be reflective on how the male students feel about entering a profession that lacks diversity and equality. Discussing inequity and bias in STEM recruiting and selection may help students as they enter the professional world, for instance. A participant indicated that discussing a variety of experiences to prepare students for workplace experiences, settings, and challenges (cultural differences as well as gender ones) has proven helpful to students.

A different participant noted that their course includes discussion of how to address inappropriate questions (for example, “Are you planning to have kids soon?”). That course tries to discuss this in an inclusive way, recognizing that there are inappropriate questions for male and female interviewees.

Others noted that “we always try to take the different perceptions of male and female students into account but are sometimes hindered by the low number of females” and asked “I am hiring a PhD researcher to do social science on female students’ experiences in STEM/engineering education. Applicants are of various genders. How will I be able to tell if they are sensitive enough to gender issues?” Likewise, discussion prompts can help reveal important issues of embedded bias and make them visible for students. A teacher explained that a male student had used the reflection activity the previous week to think about contemporary issues and the new ban on abortion in Texas. “He took it as an opportunity to be aware of how laws that don’t affect him may affect his female co-workers.” Creating a space where students feel safe and empowered to discuss uncomfortable topics can foster growth.

### **2.3 How to apply gender-sensitive methodology**

Step two of the toolkit covers how to apply gender sensitive theoretical and methodological structure. The underlying rationale is that “Research that does not apply gender-sensitive approach may draw general conclusion based on partial data” [1, p.33]. To understand social processes, both genders must be included and perspectives specific to men or women must be considered. Likewise, research on medical conditions must include both genders. Indeed, focusing “on female and male gender only is too narrow an approach, e.g. trans people are having health issues too”, one participant noted.

Researchers must consider balance of participants, gender-wise, in their research sampling. This might have distinct repercussions in engineering education research, as a workshop participant noted: “By default, my research group always tries to include gender balanced samples – however, this also means that we have an overrepresentation of female students in our sample (not representative of our population in most cases).”

Researchers also need to make sure survey questions are relevant and properly worded for male, female, pan-, or transexual respondents. Forcing people to select a response before they can move forward on a survey can yield inaccurate data, when options are insufficient to capture diverse respondents’ life experience. The toolkit asks, “Are you using gender-sensitive language in your project outline?” [1, p.34]. The toolkit notes that many European languages use masculine form, for mixed-gender groups as well as “unknown individuals, officials’ titles, names of the profession, etc.” [1, p.34]. For instance, Portuguese is gendered, “so plurals (engineers) are masculine”, one participant noted. The toolkit suggests using the feminine form or alternating it with use of the male form to help make gender and potential gender discrimination more visible in research, but a participant noted that “I sometimes feel that my using feminine form (as a female) in my content is less effective than if they see this in a male’s subject content”, reflecting traditional bias.

Regarding teaching, the toolkit asks: “Do you teach students gender-sensitive methodology? Do you use gender-sensitive language when teaching and writing course materials? Do you use visual material in gender-sensitive way?” [1, p.34]. Participants noted that whereas printed material may be written sensitively, bias is often still evident when they are “sourcing material to contextualise learning” and that they find “‘real world’ examples are less gender sensitive”. Unfortunately, “some students see visual representations as ‘token’ gestures” but regardless, it is still very important to consider visual representations and how gender bias might be embedded in photos and other graphic depictions.

Considering EER, participants noted that socialisation affects the ways in which those of various genders experience education. Teachers should consider a variety of viewpoints when making teaching intervention. Here again, of intersectionality and the importance of not treating groups homogeneously or prematurely assigning meaning or causation based on a specific demographic variable was emphasized.

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