

Exploring Gender Bias in Austrian Education: Seeing What Students are Exposed to

L. Krušić¹, B. Schuppler¹, M. Hagmüller¹ and S. Kopeinik²

¹Signal Processing and Speech Communication Laboratory, Graz University of Technology

²Social Computing, Know-Center GmbH

Abstract. With the rapid development of technology and science, the STEM job market has significantly expanded, while the gender gap in STEM is still a constant issue. Numerous studies and educational interventions have been explored to better understand and regulate this phenomenon, so far showing only limited success. This might be partly attributed to the complexity of the problem. From very early on, individuals are exposed to stereotypical gender roles that remain ubiquitous in societal structures. Thus, individuals might experience stereotype threat and fear of confirming the existing stereotype, which can be overcome through exposure to positive role models. This paper examines two types of materials that young students are exposed to before and at the time of choosing a course of study: EFL textbooks used in Austria and marketing material of Austrian Universities. We hypothesise that these materials, amongst others, impact students in their attitudes towards STEM. We report stereotypical representations of gender roles and careers in the analysed textbooks. University marketing material on the other hand, shows significant overrepresentation of female students while at the same time lacking diversity in terms of gender representation. These results indicate that students are exposed to stereotyped ideas about gender and careers from an early age on. While universities are making efforts to design gender-responsive marketing materials, aspects of diversity are still lacking.

1 Introduction

Those who pursue science, technology, engineering and mathematics (STEM) are the modern drivers of innovation. With the recent rise in digitalization and the perpetual emergence of new technological areas, the STEM job market is further growing. Consequently, choosing a STEM career promises lower unemployment rates and higher salaries (Langdon et al., 2013). Despite these advantages, engagement levels in STEM subjects are still falling and women, in particular, do not opt for STEM careers. Numerous initiatives to increase interest in STEM and reduce the gender imbalance have not yet shown any change (Smith, 2011; Indicators, 2016).

Over the past two decades, a vast amount of research has been conducted, aiming to increase our understanding of the processes and causes that lead to the evident gender gap. One line of research considers the stereotype threat as root of the problem. Research in social psychology and neurophysiological studies have shown

that stereotype threat may become a considerable factor influencing interest and performance of learners in negatively stereotyped domains. Stereotype threat describes the phenomenon that people who belong to a negatively stereotyped group (e.g., young women in the field of STEM) show poorer performance and less interest in the subject than other equally qualified people (e.g., young men). This is often explained by the fear to confirm the stereotype which impacts an individual's working memory capacity (Beilock et al., 2007; Steele, Spencer and Aronson, 2002). Although stereotypes affect all kinds of people within various domains, research particularly emphasises on women and other minorities (Régner, 2014). Cheryan et al. (2011) who investigated the influence of stereotyping through role models report that already one role model can significantly influence a person's beliefs in respect to their success in a field. While studies have shown little impact of teacher's genders on their students' STEM grades and attitudes (e.g., Carrington, Tymms and Merell, 2008; Ehrenberg, Goldhaber, and Brewer, 1995), female researchers for instance could embody such role models (Bettinger and Long, 2005). The reflective identification with a STEM role model (e.g., introduced by reading biographies) even leads to a higher degree of identification, sense of belonging and an increased intention to pursue STEM subjects (Van Camp, Gilbert and Brien, 2019).

However, the perception of dissimilarity to stereotypical role models (e.g., nerds in engineering) can cause women to reinforce their doubts regarding their abilities in a specific field (Cheryan et al., 2011). Following this argument, the efficacy of a role model is based on the perceived similarity to its observer. Interestingly, females rate their own computer science relevant abilities lower than males, and the prototypical computer scientist's ability higher than men do. Also, women perceive themselves less like the prototypical computer scientist or an engineer than men do. This needs to be taken into account, as it correlates with lower interest in pursuing computer science courses and careers (Ehrlinger et al., 2018). Moreover, the lack of role models with whom marginalized group identify with, leads to students being discouraged from participating in STEM (Simpson et al., 2020).

The perception of similarity to an individual may depend on a wide set of characteristics that essentially exceed gender and underlines the need for diversity. These characteristics include physical appearance, role behaviours, personality traits and occupations and form a multidimensional structure of a gender stereotype (Sainz et al., 2019). The subject of multidimensional representations of gender is fairly new to STEM research. However, it is known that young women long for diversity-sensitive didactic materials and a manifestation of STEM women in educational and public communication (Gaisch and Rammer, 2018). A positive perception of scientists and science classes leads to higher performance in these classes and impacts the students' preparation for their future careers. Textbooks for instance can provide

relatable examples of scientists that increase students' science identity and performance. An additional benefit is expected from an adaptation of educational materials and curricula towards a more diverse illustration of STEM characters in respect to gender, sexuality and disabilities (Simpson et al., 2020).

With this work we aim to contribute towards a better understanding of what gender roles students are exposed to on a daily basis in two different contexts, i.e., language education and college admission, as this impacts their perception of STEM subjects and subsequently their career choices.

1.1 Gender Imbalance in Educational Resources

Gender-biased representation in textbooks has become of broader interest in research as gender-based and stereotypical representations can have a lasting effect on learners' success beliefs, values and attitudes (e.g., McKown and Weinstein, 2003; Söğüt, 2018). Sunderland et al. (2000) describes three main forms in which women are commonly biased against in textbook representation - exclusion (underrepresentation), subordination and distortion (men represented in a greater range and more powerful occupations) and degradation (women being stereotypically emotional).

One type of textbooks that has received a lot of attention in gender studies are coursebooks for language learning, as they typically deal with persons in every-day life situations. Ebadi and Shahbazian (2015), for instance, analysed gender bias in English as a foreign language (EFL) coursebooks. The authors examined two coursebooks with respect to occupational roles, sports and household duties (i.e., "Right Path to English" and "Basic 2"). While in "Basic 2" female and male characters had a similar variety of occupations, in "Right Path to English" the distribution of male and female characters with regards to occupational roles were found to be unbalanced and stereotypical: male characters hold the majority of occupations and are shown as doctors, bus drivers, farmers. Women are shown with stereotypical occupations such as teachers and mothers. Furthermore, all the sports mentioned were associated with male characters (playing football, swimming, running, etc.) while none were attributed to female characters. Household duties were solely attributed to female characters (washing dishes, cooking, cleaning, helping mother in the kitchen). Similarly, Söğüt (2018) found a smaller variety of occupations associated with female than male characters, in EFL coursebooks used in the Turkish educational context. From 102 occupations represented, women were performing 32, while men were found to perform 70. The adjectives commonly attributed to women were such as "unhappy, stressed, bored, interested, inexperienced, bossy, kind, thin, rude, alone, optimistic" while the adjectives attributed to men were such as "faithful, excellent, talented, successful, the wisest, the angriest, brilliant". Women were associated more often than

men with traditional, indoor jobs, such as teacher, nurse, dancer, waitress, while men were related to outdoor and high prestigious jobs, such as professor, researcher, astronomer, director, etc. Goyal and Rose (2020) compared two editions of an English business textbook in order to establish whether the gender portrayal improved with the more recent edition. In contrast to other works that focus on images and text only, also audio files were investigated. The speech was analysed according to talk time with an additional focus on firstness in explicit social interaction. Results point to an improvement in the representation and equality of gendered characters, however, the gender imbalance is still greatly present in many of the analysed aspects, such as the total representation, professional roles, senior titles, authentic news articles, number of speakers in the audio tracks as well as the number of single gender tracks.

Specifically focusing on STEM, Kerkhoven et al. (2016) studied gender bias in the visual content of online science education resources for primary school children, extracted from the websites of Scientix and OERcommons. Their analysis showed that among 3191 characters depicted in the resources, 33.7% were boys, 29.9% girls, 22.7% men and 13.7% women. Furthermore, the authors found that significantly more male characters (75%) were depicted having a science profession, while more females were depicted as teachers (63.9%). When it comes to activities, more men than women were found in most categories (presenting, experiment, hands-on activity), except for teaching where there were more women. The analysis of Greek high school computer science textbooks by Papadakis (2018) took into account the illustrations, but also the language used. They identified linguistic sexism (i.e., the use of masculine form to denote both genders), that among 23 images used in the first-grade textbook, 16 depicted men, where all mentions of an informatics teacher were related to the male gender.

Summing up, in both foreign language and science textbooks, there has mainly been found to be an underrepresentation of female characters, fewer occupations associated with female than with male characters, and an association of both genders (male, female) with stereotypical occupations.

As part of this paper, we contribute to the existing literature on gender biases in EFL textbooks, by focusing on the chapters dealing with professions and occupations found in eight EFL textbooks used in Austrian education (ages 10-18).

1.2 Marketing Material

Marketing material is used at universities to advertise and inform prospective students about study programmes. The portrayal of gender in these university marketing materials plays a vivid role, as it is what (female) students are presented and potentially influenced with, when deciding to enrol in a particular academic program and institution.

Common marketing tools are college viewbooks that often provide the initial perception of an institution. Viewbooks are promotional brochures designed by marketing experts for the purpose of “selling” a particular university to potential students and their families (Osei-Kofi et al, 2015). Henslee et al. (2017) investigated the Indiana University-Purdue University of Indiana’s (IUPUI) viewbooks in regard to opinions and perspectives of IUPUI students on the representation of their cultural backgrounds and identities. The majority of 225 questioned undergraduate students felt well represented in the viewbooks and valued in terms of their cultural background and identity, which is linked to an improved sense of belonging. However, students felt that the viewbooks promoted more diversity than seen on campus. This is described as tokenism, which occurs when students are displayed as tokens for institutional gain, which can have a negative effect on marginalised students’ sense of cultural validation (Fletcher, 2012).

Pippert, Essenburg and Matchett (2013) investigated 165 recruitment materials from four-year institutions in the US, the authors concluded that within each brochure there is a common thread of images with standardized motifs such as a picturesque background, students studying in the outdoors, animated professors, fans cheering on a sports court. Race and gender of students are equally distributed. The authors tested the accuracy of these images by conducting content analysis of 10000 photographs of students, which are found in 165 viewbooks. A comparison of racial and ethnic groups in the images with the actual distribution at the corresponding academic institutions found that 81.2% of viewbooks demonstrated a significant overrepresentation of African-American students (9.4%). Thus, the viewbooks presented an idealistic image of campus diversity. This agrees with Pippert et al. (2013), who suggest the use of viewbooks to define and represent diversity in a broader way instead of exactly mirroring the student body.

A more extensive visual textual analysis of STEM university viewbooks was conducted by Osei-Kofi and Torres (2015). They analysed gender and race representations in 20 viewbooks related to STEM education. The authors developed codes (e.g., gendered, sexualized, active, passive, etc.) and applied it to individual images and sections of text. This was further interpreted using theoretical frameworks. Results identify the most common narrative as stereotypical white heroic male with superior abilities, a dedication to science, willingness to take risks and advance human progress. When it comes to the representation of women, they are primarily illustrated as white and associated with the attributes friendly, easy-going and attractive (“brainy babe”). Furthermore, women and people of colour are often found in roles of sidekicks, represented in a subordinate way to white men. The authors argue that such visual representations suggest that women and people of colour are “allowed” to have a part in STEM but are not expected to lead.

Stachl and Baranger (2020) explore the sense of belonging at higher levels of academia in order to determine a possible correlation with the diminishing representation of women and minorities in STEM fields. The study uncovers factors specific to the academic graduate community, such as the difficulty of feeling accepted and valued, viewed as a serious scholar, being a good mentor or a lack of a supportive social network. Once again, the study highlights the necessity of stronger administrative efforts to foster sense of belonging and allow a more diverse community of scientists to be built and maintained.

Considering the impact that representation of diversity can have on peoples' sense of belonging and furthermore on academic performance, we take a look into Austrian universities' marketing materials in order to understand currently promoted STEM role models and illustrations. With research outlined in this paper we contribute to existing work on viewbooks and their diversity representation with a focus on Austrian (technical) universities. Additionally, we provide a glimpse on gender representation at TU Graz homepage information sites, as a sample for online promotion material.

2 Gender Representation in Austrian EFL Textbooks

Textbooks reach a wide audience within our society. Their portrayal of gender identity as well as occupation-specific gender roles influences perceptions of the social norm from a young age, but also affects parents and teachers and their actions (Kherkovern et al., 2016, Söğüt, 2018). To reach a better understanding of stereotypical representations young people are exposed to, we investigate gender portrayal in Austrian schoolbooks. Primarily, this pilot study focuses on the gender representation in foreign language textbooks, and specifically on the gender distribution in respect to the representations of jobs and careers. More concretely, the study is dedicated to the following questions: is the distribution between male and female characters equal in the textbooks? Secondly, is there a gender bias in the visuals and text representing and referring to characters and their careers?

2.1 Data

The visual and textual data analysed was conducted on chapters revolving exclusively around work life, careers and jobs in eight EFL textbooks listed in Table 1. One of the analysed textbooks, "Cutting Edge" by Peter Araminta, is applicable for both junior high and high school students, while all the others are aimed for use in high schools and at higher language proficiency levels. Within the listed textbooks, 43 visual and textual gender representations were found. In this context, we defined gender representations based on images and textual references to male and female figures and characters.

Table 2. Gender representation distribution in EFL textbooks

Textbook	Authors	Level	Number of gender representations
New Headway	Soars, Liz and John	B1 (intermediate)	3
New Headway	Soars, Liz and John	C1 (advanced)	3
Innovations	Hocking, Cheryl	B1 (intermediate)	8
Innovations	Hocking, Cheryl	B2 (upper-intermediate)	4
Cutting Edge	Araminta, Peter	A2 (pre-intermediate)	11
Focus	Kay, Jones, Berlis, Brayshaw, Russel	B1 (intermediate)	4
Focus	Kay, Jones, Berlis, Brayshaw, Russel	B1 (intermediate)	4
Focus	Kay, Jones, Berlis, Brayshaw, Russel	B2 (upper-intermediate)	6

2.2 Methodology

A visual-content analysis was conducted on the sample of eight EFL textbooks which are currently used or have been used in Austrian schools. The analysis and categorization of careers was conducted according to Sögüt (2018) and Kerkhoven et al. (2016). The visual and textual analysis was done manually by one coder. Each resource was scanned for the presence of visual or textual content with the topic or related to "career choice", "summer jobs" and "professions". After that, each visual or textual representation pertaining to those topics was checked for the number of female and male characters. Additionally, the activity of each character was checked to determine whether characters were associated with stereotypically gendered careers. Furthermore, gender distribution in STEM and non-STEM professions was analysed.

2.3 Findings

The analysis was based on two research questions: Firstly, is there an equal distribution of male and female characters in the context of careers? Secondly, is there a gender bias in the visual and textual representations of characters in the context of careers and jobs?

Table 3. Distribution of female and male characters in the textbooks

Percentage of male characters	Percentage of female characters
54%	46%

The percentage differences between male and female characters, as can be seen in Table 2, was quite low (9% difference) which demonstrates a fairly equal representation of male to female characters.

Table 4. Professions attributed to characters in textbooks

Careers/ professions attributed to male characters	Number of appearances	Careers/ professions attributed to female characters	Number of appearances
cowboy	2	Trapeze artist	1
hunter	1	boxer	1
builder	2	drugs worker	1
banker	1	secretary	1
doctor	3	teacher	1
Olympian	1	Stay-at-home mother	1
rower	1	housewife	1
footballer	1	dancing queen	1
engineer	1	ballerina	1
waiter	1	singer	1
musician	1	lawyer	2
police officer	1	businesswoman	1
actor	1	shop assistant	1
fitness designer app	1	fashion designer app	1
mowing lawns	1	waitress	1
dentist	1	hairdresser	1
technician	1	nurse	1
plumber	1		
computer programmer	1		

From the career attributes associated with each gender (Table 3), we observed that female characters perform indoor jobs, as well as traditionally female ones (Sögüt, 2018), such as “teacher”, “stay-at-home mother”, “housewife”, “nurse” and “hairdresser”. On the other hand, male characters tend to be associated with more prestigious occupations, such as “doctor”, “dentist”, “police officer” and “banker” or

outdoor occupations, such as “builder”, “footballer”, “cowboy” and “hunter”, etc. Some occupations can be considered as gender neutral, since they have been associated with both genders—such as “waiter” and “waitress” as well as “musician” and “singer” which can be considered equivalent. When it comes to careers from the domain of sport, female characters were associated with stereotypically female sports such as ballet and dance, while male characters were connected to traditionally masculine sports, such as football and rowing. A male character was connected with the attribute “Olympian” which can be considered a highly prestigious occupation in sport, while no female character was associated with any similar tag. Furthermore, a female character was associated with a non-traditional sport, such as boxing. However, the female boxer was introduced in an article with the topic of whether the character should be banned from boxing, as it is not a sport that is traditionally connected with female athletes.

Furthermore, out of 23 male characters, seven were associated with STEM occupations (“technician”, “engineer”, “computer programmer”, “doctor”, “app designer”), while only one out of 17 female characters had a STEM job (“app designer”). Even though “app designer” was connected to both genders, the app associated with the female character had the topic of a “boutique” and the app the male character created was an “exercise app”, which further plays into gender stereotypes.

3 Gender Representation in Austrian University Marketing Material

There are many ways in which a university can represent itself to potential students e.g., career fairs, open houses, summer programmes. However, the internet has become the primary source of information on university enrolment (Hartley and Mophew, 2008). In addition to web information pages, Austrian universities provide brochures or viewbooks to download, as an information and recruitment tool. Such materials typically include photos of current students and teachers, who represent alleged role models. To better understand what prospective students are exposed to and thus, might be influenced with, we investigated images in the promotional material of university bachelor programs. We hypothesise that these materials are a potential resource in attracting women and generally a more diverse audience to STEM programmes. Our focus is twofold. First, it lies on investigating the symbolic portrayal of gender diversity in Austrian university *viewbooks*. Second, we took a deeper look on *web information material* found at the TU Graz homepage and analyse visual attributes of student representations.

3.1 Viewbooks

3.1.1 Data

We retrieved viewbooks from the websites of three universities that offer exclusively STEM bachelor programmes: Vienna University of Technology (TU Wien, 2019), Graz University of Technology (TU Graz, 2019), the University of Leoben (Montanuniversität Leoben, 2019) and two non-technical universities: Vienna University of Economics and Business (WU Wien, 2019) and Uni Graz (REWI Uni Graz, 2019). This adds up to a number of 52 viewbooks collected as follows: 13 TU Wien, 19 TU Graz, 12 Montanuniversität Leoben, 7 WU Wien and 1 by Uni Graz.

3.1.2 Methodology

The visual content representation of Austrian university viewbooks was analysed in order to determine the gender distribution and representation. The methodology was based on Pippert et al. (2013) who examined photographic portrayal of racial and ethnic diversity in university recruitment materials. Every available photograph was used as a unit of analysis, where each illustrated person was identified in gender (i.e., male or female) and role (i.e., student or lecturer). Small images such as crowd shots were excluded from the analysis. Ambiguous depictions would have been noted, if encountered, as that would speak for the visual diversity of the representations in the viewbooks. However, such depictions were not identified.

3.1.2 Findings

In TU Wien viewbooks we found a noteworthy difference in the numeric representation of male and female students (68% vs. 29%), as well as male and female professors (3% vs 0%). The gender distribution of student representations in viewbooks of TU Graz and Montanuniversität Leoben was significantly more balanced (TU Graz - 51.5% male and 43.5% female students, Montanuniversität Leoben—56% male and 44% female students) than in the viewbooks of the remaining universities at glance. Still there was a notable difference in the male vs. female lecturer ratio in TU Graz viewbooks (4% vs. 1%), not displayed in non-technical university viewbooks.

Table 5. Paired differences of actual and photographic representation of gender diversity

University	Photographic mean (male students)	Student body mean (male students)	Difference (male students)	Photographic mean (female students)	Student body mean (female students)	Difference (female students)
TU Graz	54.3%	69.6%	-15.4%	45.7%	30.4%	15.3%
WU Wien	41.7%	52.0%	-10.3%	58.3%	48.0%	10.3%
TU Wien	70.5%	71.1%	-0.6%	29.5%	28.9%	0.6%
Montan Universität Leoben	56.3%	75.8%	-19.5%	43.7%	24.2%	19.5%
UNI Graz (REWI)	50.0%	41.1%	11.1%	50.0%	58.9%	-8.9%

In general, the study reveals an under-representation of the male student body and an over-representation of the female student body. As presented in Table 4 this is true for all universities except REWI. For instance, when taking into account the actual student body at TU Graz and the representation of the male population in the viewbooks, there is a -15% mean difference, which signifies under-representation. Furthermore, there is a similar mean difference with regard to the female population at TU Graz, as the analysis of the viewbooks resulted in a 15.3% over- representation.

3.2 Web Information Material

3.2.1 Data

In order to analyse the representation of gender in a career information context at the TU Graz, we collected photos of the web information page of the bachelor's degree programmes¹. The first subject of our investigation was cover photos. Each programme uses a cover photo to link to their subpage, presenting detailed information on the subject. The cover photos either show research objects, or human actors (i.e., groups or single individuals). We extracted the pictures that show human actors. This led to a collection of seven group pictures and eight portrait photos. For the second collection of pictures, we looked into the programme descriptions. Here we selected the nine most popular programmes (i.e., programmes with at least 400 students enrolled): Mechanical Engineering, Electrical Engineering, Information and Computer

¹ <https://www.tugraz.at/en/studying-and-teaching/degree-and-certificate-programmes/bachelors-degree-programmes/overview-bachelors-degree-programmes/>

Engineering, Mechanical Engineering and Business Economics, Computer Science, Software Engineering and Management, Civil Engineering Sciences and Construction Management, Biomedical Engineering, Architecture. This collection results in 17 portrait photos.

Table 6. Distribution of gender in cover photos

Type	Count	Females
Cover Photo Group	7	7
Cover Photo Single P.	8	7
Portrait Photo	17	8

3.2.2 Methodology

The parameters that were selected for observation were based on Sülflow and Esser (2014), who compared the stereotypes of politicians in different countries. In line with related literature (Kinnerbrock and Knieper, 2014), the approach assumes that there is a silent agreement on what certain mimics, gestures and postures mean within a society.

Mimics: Facial expressions transport different messages. For instance, joyful, smiling, laughing is related to being successful and self-confident. Frowning, tense facial expressions or drooping corners of the mouth suggest dissatisfaction and discomfort.

Gesture: As positive we considered gestures like handshakes that stand for solidarity (Fleissner, 2004), or thumbs up, waving and victory signs that incorporate victory poses. A bent upper body or forward moving gestures stand for assertiveness and dynamics. Negatively perceived are rigid postures, leaning on to something, crossed arms, or hands in front of the face.

Context: Other factors that might influence how we perceive a person is the context in which the person is visualised. For instance, clothing, age and skin colour are factors that influence our sense of relation. Does the person look sportive, young, approachable or rather serious and professional? Other factors are the position of a person and the background colours of the picture.

3.2.3 Findings

Our analysis of the TU Graz web information page on bachelor's degree programmes showed a strong over-representation of female student portraits. This indicates that the TU Graz aims to exploit such mediums to endorse the growth in female student population. A closer look, however, revealed a number of potential shortcomings such as i) a very distinctive presentation of gender roles (i.e., illustrated females are overly attractive, with long, straight, "darkish" hair and a skinny body shape, whereas males

have short, straight hair, mostly dark, and a standard body shape; skin colour indicates European heritage), ii) the complete absence of physically impaired people and iii) the depiction of people presumably older than thirty solely as males in teaching roles. The remainder of this section provides an overview of the analysis structured by presentation types and observed characteristics.

Cover Photos. In group photos, we found a perceived equal representation of female and male students. In cover photos featuring only one person, the female representation was 87.5%. Furthermore, we observed:

- Two photos show someone explaining something. Those are men.
- Two photos show student groups in spontaneous postures: Architecture and GeoScience.
- Five of seven pictures are obviously setup.

Cover Photos Featuring One Person. We found 8 cover photos that feature only one person, seven female and one male. This is a very strong overrepresentation of females. Four could be assessed as overly attractive. One picture does not show the woman's face. Three out of four women depicted working show a tense facial expression, which is connoted negatively.

Portraits. In the portrait section of the nine selected bachelor programmes, we discovered the photos of eight female and nine male students.

Overall Picture. A comparison of female and male as well as cover and portrait photos is illustrated in Table 6.

- 1 Mimics: There is no difference between genders but in respect to cover or portrait photos. In portrait photos 65% of people are laughing or smiling. In cover photos facial expressions are distributed through the categories.
- 2 Gesture: Male students are more often displayed in dynamic positions (bend upper body) and with crossed arms, while females in occasionally lean on to something.
- 3 Context: Presentation of gender is very clear. Women are overly attractive, with long, straight, "darkish" hair, skinny, successful and European (light skin colour). Men have short, straight hair, mostly dark, a standard body shape and light skin colour.
- 4 The illustration of physically impaired people is completely missing.
- 5 People that look older than thirty are male and solely depicted in teaching roles.
- 6 The information material over-represents women in six of the nine study programmes.

Table 7. Representation of gender in cover photos

		Female (%)	Male (%)	Cover (%)	Portrait (%)
Mimics					
	smiling/laughing	53	60	37	65
	neutral	27	20	25	24
	tense	20	20	38	12
Gesture					
	bend upper body	13	40	13	29
	leaning on something	20	0	13	12
	crossed arms	0	20	0	12
Context					
Clothing	business	73	60	75	65
	casual/sporty	27	40	25	35
Haircut	short	0	100	13	53
	middle	20	0	13	12
	long	80	0	75	35
Hair-colour	dark	27	70	38	47
	brunette	67	10	63	35
	blond	7	20	0	18
Hair-style	straight	87	90	86	88
	curls	13	10	13	12
Body-shape	skinny	87	20	75	53
	average	13	60	13	41
	chubby	0	20	13	6
Skin-colour	light	93	90	100	88

4 Discussion and Future Work

This paper is motivated by the inherent economic need for qualified STEM personnel and the existing gender imbalance in STEM fields that substantially contributes to the problem. We hypothesize that role model representations in educational material can intensify effects of stereotype threat and thus, lower the likelihood of women to pursue STEM subjects. To better understand factors that influence Austrian's young people in their career choices, we examine existing i) educational materials and ii) university marketing material. In respect to educational material, we investigate eight EFL textbooks used in Austrian schools. Even though, we find the distribution of gender representation in the material to be fairly equal, the analysis shows a gender bias with regard to the relationship of gender and career choice as well as occupation and jobs.

Female characters are associated with stereotypical, traditional jobs, while STEM occupations are almost exclusively associated with male characters. These results add to a significant body of prior research (e.g., Goyal and Rose, 2020; Söğüt, 2018, Papadakis, 2018) on implicit gender bias in primary and secondary school textbooks. Biased depictions potentially trigger stereotypical thinking in both the students and the teachers (Kherkovern et al., 2016, Söğüt, 2018), which in the long run might cause a lower interest of female students in STEM related fields (Ehrlinger, 2018). A promising approach is suggested by Söğüt (2018) who asks for a higher involvement from teachers; in a sense of recognising, pointing to and correcting gender-biased content in the textbooks and so prevent the formation of stereotypical values and practice.

The analysis of marketing material was addressed in two parts. First, the analysis of Austrian university viewbooks revealed a noteworthy difference in the numeric representations of male and female students in the viewbooks by TU Wien. Viewbooks by WU Wien, TU Graz, Montanuniversität Leoben and UNI Graz showed a balanced gender distribution. However, the analysis has pointed to a significant overrepresentation of the female student body and an underrepresentation of male students in the cases of TU Graz and Montanuniversität Leoben. The opposite was true in the UNI Graz viewbook, with an overrepresentation of the male student body. The viewbooks show an unrealistic image of campus diversity created to attract more students from the minority groups, striving to balance an existing gap. Instances of overrepresentation of minority groups in university viewbooks seem to be a common practice (Pippert et al, 2013). Even though this is a popular marketing strategy, such representations of diversity may have a contrary effect, by making the students feel as “tokens” for institutional gain (Henslee et al., 2017; Fletcher, 2012; Pippert et al., 2013). As Pippert et al. (2013) suggested, we also believe that even though the answer might not be to perfectly mirror the campus reality in the marketing materials, universities should strive to define and represent diversity in a broader way. Furthermore, female professors (unlike their male counter-parts) were notably under-represented in the technical fields. As previous research (Gaisch and Rammer, 2018; Simpson et al., 2020) proposes, positive role models of the same gender potentially attract female students to STEM and thus there is a necessity that female professors are as represented as their male colleagues.

The second part, a glimpse on the gender representation of the TU Graz web information page on bachelor’s degree programmes showed an even stronger overrepresentation of female student portraits. This underlines the existing efforts of TU Graz to use marketing materials to attract female students. A closer look, however, revealed a number of potential shortcomings such as i) a very distinctive presentation of gender roles (i.e., illustrated females are overly attractive, with long, straight, “darkish” hair and a skinny body shape, whereas males have short, straight hair, mostly

dark, and a standard body shape; skin colour indicates European heritage), ii) the complete absence of physically impaired people and iii) the depiction of people presumably older than thirty solely as males in teaching roles. This lack of diverse representation can affect an individual's sense of belonging (Stachel and Baranger, 2020) and therefore influence their choice of discipline and/or lead to lower academic achievements (Stachel and Baranger, 2020).

With this contribution we add to the current body of research on the representations of gender and diversity in Austrian textbooks. Furthermore, we expand the outlook on marketing materials students receive after finishing high school, in hopes of understanding the influences and processes that lead to the growing gender gap in STEM.

In future we will expand our analysis of educational and marketing materials, with an investigation on how readers and particularly students perceive the gender representations found within these textbooks and viewbooks. In line with related research, leading questions will encompass effects on student's sense of belonging, self-confidence, interest on and likelihood to pursue a certain subject. We expect the results to deepen our understanding of the impact of role model representations portrayed in educational and marketing materials on students' career choices. We will also explore the influence of diversity aspects that go beyond the attribute of gender.

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