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A teacher like me: the role of teacher gender representation and gender stereotypes in education

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CHAPTER **ONE**

General introduction

In many Western countries like the Netherlands children are obliged to attain primary and secondary education from the age of five until the age of sixteen (Rijksoverheid, 2022). As a result, people spend a significant part of their lives in schools interacting with teachers. Teachers can therefore play an important role in the development of an individual's interests, self-beliefs, and performances in school and further life (Fredriksen & Rhodes, 2004). Indeed, everybody may remember a teacher that played a decisive role in their development. For me, one of my teachers later turned out to be an important inspiration for this research. One incident in particular showed me the possible consequences of gender and gender stereotypes in education: In secondary education during an ordinary math class, I was discussing my plans for the weekend with two of my male peers instead of working on my math homework. Our math teacher corrected us and told us to pay attention to our homework. Then he explained why. He turned to my male peers and explained that they should pay attention so they could achieve higher grades in math. He turned to me and explained that I should pay attention so I would not fail the class. However, until that moment, I had achieved the same grades in math as my male peers. The gendered message of my math teacher contributed to the feeling that I could not excel in math, and I believed that for a long time, until I started with statistics in my masters under the supervision of a female professor.

1.1 THE ROLE OF GENDER AND GENDER STEREOTYPES IN EDUCATION

Like many Western societies, Dutch society is characterized by gender role segregation; men and women fulfil different roles within society (Daalmans et al., 2017). For instance, in families, men often fulfil the role of breadwinner, while women work part time and take on most of the care of the children (OESO, 2019). Further, the educational and professional pathways of men and women are segregated in which men are overrepresented in the Science, Technology, Engineering, and Math (STEM) sector while women are overrepresented in languages, early education, and the health care sector (Onderwijsraad, 2019).

This gender role segregation corresponds with and reinforces gender stereotypes that describe men as being naturally talented at leadership roles and STEM skills and women as being naturally talented at caretaking and languages/communication skills. Gender stereotypes are socially constructed ideas that describe what men and women are like and prescribe what men and women should be like regarding their appearances, capabilities, interests, and behaviors (Ellemers, 2018). Gender stereotypes are transmitted to individuals from a very young age and gender stereotypes evolve during one's lifetime (Bem, 1981). Following social cognitive theory, individuals' gender stereotypes develop through direct information, social consequences to gender-typed behaviors, and most importantly through observing the behaviors and roles of men and women in one's environment (Bussey & Bandura, 1999). Men and women that confirm stereotypical gender roles can strengthen individuals' gender stereotypes whereas men and women that counteract stereotypical gender roles can weaken individuals' gender stereotypes. Individuals' gender stereotypes can influence interests, beliefs, and behaviors of oneself and others (Bem, 1981).

The psychological processes of transmission of gender stereotypes and the impact of gender stereotypes also take place in schools (e.g., Maries et al., 2020; Muntoni & Retelsdorf, 2018; Thompson, 2003). Students' and teachers' gender, among others, may play an important role in these processes (Jungbluth, 1982). In particular in subjects with gender stereotypes connected to them, students' gender stereotypes may affect students' interests, self-beliefs, and performances (e.g., Brown & Stone, 2016). In these subjects, the mere presence of a male or female teacher may play an important role in students' gender stereotypes. For instance, the gender of a math teacher may confirm or contradict the gender stereotype that men are good at math and women are bad at math (Ten Dam & Volman, 1991). The mere presence of a female math teacher may weaken students' gender stereotype about math, while the mere presence of a male math teacher may strengthen students' gender stereotype. Further, the gender of a teacher may influence the strength of teachers' own gender stereotypes (Martin & Dinella, 2012; Smeding, 2012). A female math teacher herself may have weaker gender stereotypes because of her personal experience of becoming a math teacher as a woman.

Negative gender stereotypes (i.e., men/women are bad at...) are generally easier to internalize and more resistant to change than positive gender stereotypes (i.e., men/

women are good at...) (Baumeister et al., 2001). The role of gender and gender stereotypes may- therefore be more important for students and teachers in subjects in which they are confronted with negative gender stereotypes. Hence, the role of teachers' gender and gender stereotypes can be important in STEM subjects for female students and teachers because these are the subjects in which women are stereotypically thought to have performance deficits. The role of gender and gender stereotypes can be important in language subjects for male students and teachers because these are the subjects in which men are stereotypically thought to have performance deficits. As a consequence, student-teacher gender congruence (i.e., student and teacher having the same gender) might play an important role in STEM for females, and in languages for males.

The consequences of students' and teachers' gender as well as STEM/languages gender stereotypes are demonstrated in previous research. A large body of research in different scientific disciplines demonstrated that student-teacher gender congruence can positively affect students' performance (e.g., Dee, 2005). In addition, students with relatively strong gender stereotypes were found to perform worse than students with relatively weak gender stereotypes (e.g., Maries et al., 2018). Further, teachers' gender stereotypes were found to translate into different expectations of male and female students which in turn were related to students' performance (Muntoni & Retelsdorf, 2018).

This body of evidence led previous research to suggest that effects of student-teacher gender congruence on students' performance can be explained through the role of gender stereotypes. However, empirical tests of these mechanisms are rare and solely situated in the 'females in math' context (Xu & Meier; 2021; Zhang, 2019). As a result, still little is known about *where and when* effects of student-teacher gender congruence occur, and there are still important gaps in our understanding of *how* effects of student and teacher gender emerge (Volman, Ten Dam, & Van Eck, 1995; Ten Dam, Van Eck, & Volman, 1997). In response, the main aim of this dissertation is to receive a better understanding of the role of students' and teachers' gender and gender stereotypes in student performance in order to contribute to the scientific, as well as the public, debate on the role of gender in education. The main research question is:

> *Does student and teacher gender affect students' performance and what is the role of gender stereotypes in this relation?*

To increase the understanding of the role of gender and gender stereotypes in student performance, I first explore the relation between student-teacher gender congruence and students' performance in different subjects across educational contexts that are assumed to differ in the extent to which gender stereotypes play a role. In doing so, I try to specify *when and where* student-teacher gender congruence is associated with student performance. Subsequently, I zoom in on the individual level and integrate theories from different disciplines to propose mechanisms including gender stereotypes that may underly relations

between student and teacher gender and student performance. I do so by focusing on psychological processes in students and teachers. From the student perspective and the teacher perspective, I propose mechanisms that explain the theorized influence of the mere presence of a male or female teacher (student perspective) or student (teacher perspective) through the role of gender stereotypes in (un)conscious psychological processes. In this way, I aim to add to our understanding of *how* effects of the gender of a teacher emerge. This study's research angles are visualized in Figure 1.1.

The remainder of this chapter has five distinct sections. First, Section 1.2 provides an overview of studies on representative bureaucracy in public administration as a starting point for building a framework for understanding the relation between student-teacher gender congruence and student performance. In Section 1.3, I explore the role of educational context. I theorize in which educational contexts student-teacher gender congruence can affect students' performance. Thereafter, in Section 1.4, I shift to social psychological theories and propose mechanisms that explain effects of students' and teachers' gender on student performance from both the student and the teacher perspective. Section 1.5 describes the research setting and methods of this study. Finally, in Section 1.6 the aim and outline of this dissertation is discussed.

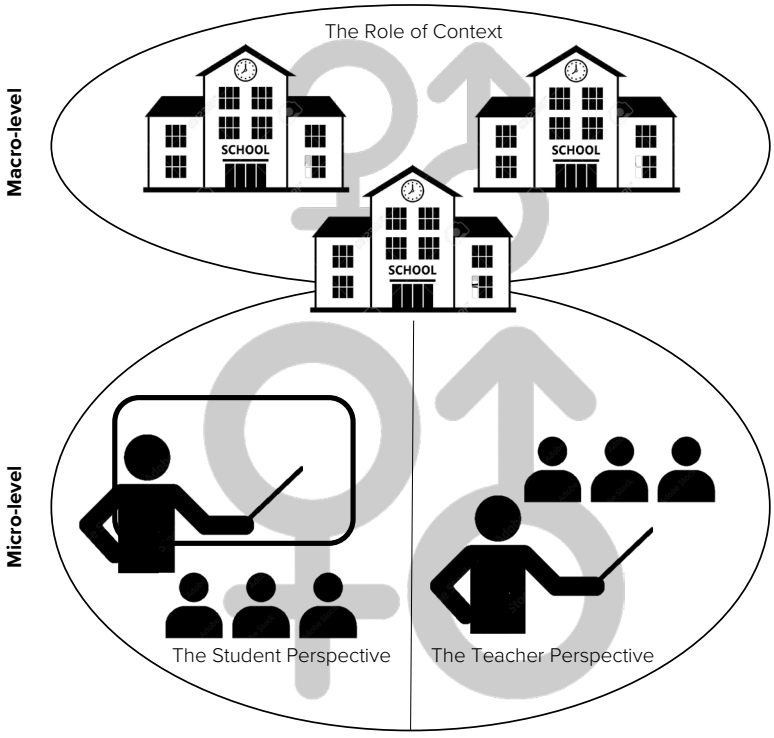

Figure 1.1. Research Angles

1.2 STUDENT-TEACHER GENDER CONGRUENCE AND STUDENT PERFORMANCE

The association between the gender of a teacher and male and female students' performances has been demonstrated by a large body of research in different scientific disciplines (e.g., Holmlund & Sund, 2008; Winters et al., 2013). In particular the match between teachers' gender and students' gender (i.e., student-teacher gender congruence) has been suggested and found to positively affect students' performance (e.g., Dee, 2005; Song 2018). Despite the large number of studies on the topic and gender theories on the general role of gender in education (e.g., Thompson, 2003), a gender theory that focuses on the effects of student-teacher gender congruence specifically does not exist. However, a substantial part of the studies on the relation between student-teacher gender congruence and student performance stem from research within the field of public administration that focus on representative bureaucracy. This stream in the literature focuses on effects of gender representation within the government and often situates empirical tests in the educational setting. Consequently, representative bureaucracy literature can be a suitable framework to start theorizing the influence of student and teacher gender on student performance**.**

Scholars within representative bureaucracy literature argue that the demographic composition of public organizations should reflect the demographic composition of the people they serve for democratic reasons. By representing different groups in the population, public organizations show equal access to administrative positions and create more connection between citizens and the government (Sowa & Selden, 2003). This results in more legitimacy and credibility for public organizations and their policies (Sowa & Selden, 2003). Apart from this normative argument, a large body of research found that public organizations with high levels of representativeness perform better than their less-representative counterparts (for an overview see Meier, 2019). The education system is a large and important part of the public sector (Meier & Stewart, 1992). This is one of the reasons why empirical tests of representative bureaucracy are often situated within the school context. A great deal of this research focuses on the role of gender representation in female students' math performance (e.g., Keiser et al., 2002). Studies in western countries (e.g., Keiser et al., 2002), Asian countries (e.g., Dhillon & Meier, 2020), and African countries (Agyapong, 2018) found that female students' math performance improved when the share of female teachers in the subject increased.

These positive associations between gender representation and female students performance are attributed to effects of passive representation, active representation, or symbolic representation. Passive representation refers to the composition of a workforce and suggests that the presence of representatives improves awareness among all members of the workforce on issues that affect outcomes for the represented. As a result of this awareness, behaviors of all members of the workforce are suggested to change and to translate into beneficial outcomes for the represented (Groeneveld & Meier, 2022). Following

this reasoning, the presence of female math teachers improves awareness and changes all (female and male) math teachers' behaviors that affect female students' performance (e.g., teaching approaches that benefit female students' performance). Active representation concerns the behaviors of bureaucrats, i.e., teachers, that directly translate into benefits for represented students (Grissom et al., 2015). For instance, female math teachers may spend more time on instructing female students or female teachers may give more positive feedback to female students. These active representative behaviors may directly translate into better performance of female students. Symbolic representation refers to the changes in attitudes, beliefs, and behaviors in the student as a result of the mere presence of a representative teacher. Female students may feel more confident in their ability in math as a result of being taught by female math teacher. This in turn may improve female students' math performance (An et al., 2021; Beilock et al., 2010; Xu & Meier, 2021; Zhang, 2019).

Despite the increasing number of studies that focus on these individual level effects of representation in education, the suggested mechanisms underlying active and symbolic representation are rarely theorized and empirically examined (Xu & Meier, 2021; Zhang, 2019). Consequently, still little is known about the explanatory mechanisms underlying gender representation including the working of gender stereotypes. Although scholars recognized the role of gender stereotypes (e.g., Riccucci & Van Ryzin, 2017), representative bureaucracy scholars made limited use of social psychological theories on this topic to unravel the working of gender representation through the role of gender stereotypes. Further, despite research on organizational (e.g., Song, 2018) and national (An et al., 2021) contexts that may facilitate or impede effects of gender representation, still little is known about the role of contextual factors in the vicinity of a public organization (Ding et al., 2021). In particular for schools, besides national contextual factors, contextual factors in the vicinity of the organization may play an important role in representation.

In the following paragraphs, these gaps in the literature are assessed using insights from social psychological theories on gender stereotypes. First, the role of context in the association between student-teacher gender congruence and student performance will be discussed. Thereafter, possible mechanisms underlying effects of representation are explicated.

1.3 WHEN AND WHERE: THE ROLE OF CONTEXT

An important condition for effects of gender representation to occur is gender salience (e.g., Keiser et al., 2002; Ding et al., 2022). Gender salience refers to the extent to which gender is perceived as an important characteristic. When gender is perceived as an important characteristic, a gender-related self-concept is activated which allows gender to have an influence (Palan, 2001). The rigidity of gender stereotypes in given contexts might contribute to the extent to which gender is perceived as an important characteristic. When gender stereotypes in a context are rigid, gender becomes an important characteristic

for individuals' identity, interactions, and performances (Hilliard & Liben, 2010; Kiefer & Sekaquaptewa, 2007; Shih et al., 1999).

As described above, the capabilities of men and women are gender stereotyped as fundamentally different in STEM and language subjects (i.e., men are good at STEM and bad at languages while women are good at languages and bad at STEM) (Arnot et al., 1998; Guimond & Roussel, 2000). Because negative gender stereotypes (i.e., bad at) are generally easier to internalize and more resistant to change than positive gender stereotypes (Baumeister et al., 2001), gender may become a salient characteristic for the group that is stereotypically thought to have performance deficits in the subject (Beilock et al., 2010; Spencer et al., 2016). Hence, I expect student-teacher gender congruence to be associated with female students' performance in STEM and for male students' performance in languages. In the first study, we test this hypothesis led by the research question:

> *To what extent is student-teacher gender congruence associated with male and female students' performance in math, physics, Dutch language and French language?*

In addition to the type of subject, the extent to which gender stereotypes connected to subjects play a role in effects of gender in education may differ across different educational contexts (Arnot et al., 1998). Previous research indicates that gender stereotypes might be more rigid among students in lower educational levels (Turner et al., 2019), in religious schools (Schulze & Tomal, 2005), and in schools located in less-populated areas (Garcia-Retamero et al., 2011). Research on socioeconomic status showed that gender stereotypes were stronger among lower socioeconomic groups (Turner et al., 2019). As educational level and socioeconomic status are closely related concepts, the same might be true for students in lower educational levels. Further, gender stereotypes might be stronger in religious environments and less-populated areas because these are environments in which people tend to have more conservative and traditional views on roles of men and women (De Vries et al., 2022; Istenič, 2007). In these contexts, in which gender stereotypes are assumed to be relatively strong, the associations between student-teacher gender congruence and student performance might be strengthened. The second research question in the first study is therefore:

> *What is the role of students' educational level, schools' religiousness, and schools' location in the relation between student-teacher gender congruence and students' performance?*

1.4 HOW: INDIVIDUAL-LEVEL MECHANISMS INCLUDING GENDER STEREOTYPES

As mentioned before, gender stereotypes are socially constructed ideas about what is typical and appropriate for men and women (Ellemers, 2018). Gender stereotypes affect individuals' attitudes, beliefs, interests, and behaviors of oneself and others through attempts to adhere to these ideas about men and women (Bem, 1981; Bussey & Bandura, 1999). The attempts to adhere to gender stereotypes (i.e., the processes through which gender stereotypes are transmitted and translated into attitudes, beliefs, interests, and behaviors) manifest on an implicit (unconscious) and an explicit (conscious) level. The implicit level refers to the automatic and less controllable distinction between men and women, whereas the explicit level refers to the purposeful and controllable distinguishment between what is typical of and appropriate for men and women (Fazio & Olson, 2003). Implicit and explicit gender stereotypes are only weakly correlated, in part because of explicit measures' sensitivity to social desirability or lack of insight in one's own stereotypes (Fazio & Olson, 2003). For instance, teachers can report that they do not differentiate between male and female students, whereas the observation of implicit gender messages in the classroom can prove otherwise (Jones & Myhill, 2004; Nürnberger et al., 2016).

A large body of research demonstrated that gender stereotypes can affect students' performance through psychological processes in students (e.g., Heyder & Kessels, 2017) or through psychological processes in teachers (e.g., Alan et al., 2018). As a result, gender stereotypes are often assumed to underly effects of student-teacher gender congruence on student performance but only a handful of studies empirically tested such mechanisms (Xu & Meier, 2021; Zhang, 2019). In a qualitative study, Xu and Meier (2021) tested whether female math teachers actively try to reduce gender stereotypes in female students, but they did not find evidence for this hypothesis. Zhang (2019) tested whether students' explicit gender stereotypes mediate the positive relation between student-teacher gender congruence and female students' math performance. Although the direct effect of student-teacher gender congruence was much larger, he found a small significant indirect effect through students' gender stereotypes (Zhang, 2019). Important gaps in the understanding of the role of gender stereotypes remain, including questions about the psychological processes in which explicit and implicit gender stereotypes are manifested. In the following paragraphs, I propose psychological mechanisms in students and teachers that may explain the role of student and teacher gender on student performance through the role of gender stereotypes.

1.4.1 THE STUDENT PERSPECTIVE

In their social cognitive theory, Bussey and Bandura (1999) argue that gender stereotypes develop through the observation of and in the interaction with one's environment. Three modes of influence are distinguished: direct information, social consequences to gender

related behaviors, and modelling (Bussey & Bandura, 1999). Direct information refers to learning from people, books, or tv series that communicate explicit, but mostly implicit statements about what is appropriate for men and women. Social consequences to gender related behaviors refer to learning from the reaction of the environment to behaviors that are seen as typically masculine or typically feminine. Behavior of men and women that is congruent with gender stereotypes is likely to be rewarded with attention and positive feedback, while behavior that is incongruent with gender stereotypes is likely to be penalized through lack of attention and negative feedback. The last mode of influence, modelling, is assumed to be the most persuasive form of transmission of gender-linked information (Bussey & Bandura, 1999). Modeling refers to the observation of men and women in the environment of an individual, including teachers in schools. Through observing gender roles and through observing behaviors of men and women, individuals learn about underlying gender norms and structures that describe what is typical and appropriate for men and women. Moreover, the more frequent an individual is confronted with models that confirm gender stereotypes, the stronger the gender stereotypical beliefs in an individual can become. The mere presence of male math teachers can strengthen students' gender stereotypical beliefs that describe math as a masculine subject. At the same time, the mere presence of female math teachers can contradict the gender stereotype weakening students' gender stereotypical beliefs.

Consequently, students' gender stereotypes can translate into students' performance. A large body of research demonstrated the association between gender stereotypes and performance (e.g., Heyder & Kessels, 2013). An often-cited study of Beilock et al. (2010) demonstrated that the presence of female teachers that are anxious of giving math negatively affected female students' math performance, but only of those female students who believed the gender stereotype that women are bad at math. Further, studies on stereotype threat provide convincing evidence that the activation of gender stereotypes can lead to performance deficits (e.g., Walton & Spencer, 2009).

Bussey and Bandura (1999) emphasized that gender stereotypes affect performance through mechanisms including self-efficacy beliefs. The internalization of gender stereotypes can lead to self-efficacy beliefs that adhere to perceived social gender norms. For instance, a female student with strong gender stereotypes may believe that she is bad at math because she is a woman. Being a woman in combination with the believe in the gender stereotype affects her self-efficacy in math. Self-efficacy beliefs include students' self-perceived abilities and academic self-concept which are found to influence students' performance (e.g., Chamorro-Premuzic et al. 2010; Greven et al. 2009; Marsh et al., 1988; Wach et al. 2015). Based on the above, I propose a mechanism that explains the relation between student-teacher gender congruence and student performance through students' gender stereotypes and self-efficacy beliefs. The mechanism is visualized in Figure 1.2.

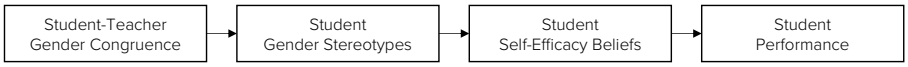

Figure 1.2. The Effect of Student-Teacher Gender Congruence on Student Performance

We empirically test the proposed mechanism in the second and third study of this dissertation. The second study focuses on the first part of the mechanism and examines the influence of student-teacher gender congruence on students' academic self-concept through students' explicit gender stereotypes led by the research question:

> *How does teacher-student gender congruence influence the academic self-concepts of female and male students?*

The third study builds on the second study and examines the role of student-teacher gender congruence in student performance through students' implicit gender stereotypes and students' self-perceived efficacy. The research question is formulated as:

> *What psychological processes in students can explain the association between student–teacher gender congruence and student performance?*

1.4.2 THE TEACHER PERSPECTIVE

Gender stereotypes can translate into gender biased expectations and behaviors towards other men and women. Gender schema theory explains that individuals' behavior towards men and women is guided by their gender schema's that consist of gender-typed information and experiences (Bem, 1981). Individuals with strong gender schema's make a strong distinction between what is typical and appropriate behavior for men and women (i.e., men and women are seen as fundamentally different). These gender schema's influence individuals' perception of men and women and guide their expectations of and behavior towards them.

In schools, teachers with strong gender schema's are likely to have different expectations of and behaviors towards male and female students. These different expectations and behaviors can affect student performance through differential attention, feedback, or grading of male and female students (Muntoni & Retelsdorf, 2018). Indeed, research on gender grading bias suggested that gender stereotypes can affect gender bias in teachers' grading (e.g., Protivínský & Münich, 2018).

As mentioned before, teachers' gender-related experiences can affect the strength of teachers' gender stereotypes. Female teachers in STEM and male teachers in languages may have weaker gender stereotypical beliefs then their counterparts because of their personal experience that contradicts the gender stereotypes. As a consequence, these teachers may have more equal expectations of male and female students which in turn may

result in more equal grading practices (i.e., less gender grading bias). Based on the above I propose a mechanism that explains the difference between male and female teachers' grading bias against male or female students through teachers' implicit gender stereotypes and gender-typed expectations. The mechanism is visualized in Figure 1.3. In the fourth and last study, we empirically test this mechanism led by the research question:

> *To what extent is teachers' grading gender biased and what is the role of teachers' gender and teachers' implicit gender stereotypes in gender grading bias?*

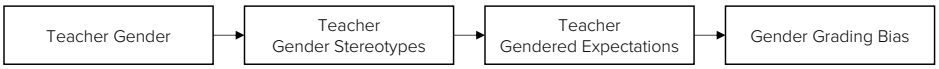

Figure 1.3. The Effect of Teachers' Gender on Teachers' Grading of Male and Female Students

1.5 METHOD

By means of four empirical studies with different methodology, this dissertation examines the relations between student and teacher gender, gender stereotypes, and student performance. Table 1.1 provides an overview of the method, population, subject, period of data collection, and sample size that were used in each study. In the first study, we collected administrative data of secondary schools. The use of administrative data resulted in a large and representative sample of Dutch secondary school students and their teachers. The data allowed us to test the association between student-teacher gender congruence and students' math, physics, Dutch language, and French language performance. Additional school data enabled us to explore the role of educational contexts in these effects.

Table 1.1. Research methods

	Method	Population	Subject	Period data collection	Sample size
Study 1	Secondary data analyses	Administrative data secondary schools	Math, Physics, Dutch language, French language	2020-2021	N > 50,000
Study 2	Vignette Experiment	Secondary school students	Math	2017	N = 410
Study 3	Longitudinal study	Secondary school students	Math, Dutch language	2018-2022	N = 329
Study 4	Field Experiment	Teachers in training	Math, Dutch language	2020-2021	N = 358

In the second study, we zoomed in on an individual-level mechanism from a student perspective. By means of a vignette study among students in a Dutch high school, we examined the influence of the mere presence of a male or female math teacher on both male and female students' gender stereotypes and academic self-concept in math. After being exposed to a gender manipulation in a short text, we measured students' explicit gender stereotypical beliefs and academic self-concept. In doing so, we were able to test causality in the relation between student-teacher gender congruence, students' gender stereotypes, and academic self-concept.

In the third study, we extended the examination of the individual-level mechanism from the student perspective. We used multisource data of a wave in a longitudinal research project to test the associations between student-teacher gender congruence, students' implicit gender stereotypes, self-efficacy beliefs, and performance in math and Dutch language. During family home visits, student data were collected by means of a combination of interviews, questionnaires, and an implicit association test (IAT) resulting in real-life and individual level data.

In the fourth study, we examined the influence of students' gender on male and female teachers' grading in math and Dutch language and we tested the role of teachers' implicit gender stereotypes and gendered expectations in the relation. We did so by means of a field experiment among teachers in training. Teachers in training were asked to grade real-student answers and were asked to complete a short questionnaire with implicit measures including an IAT. These components enabled us to minimize social desirability and conscious behaviors and to grasp real gender biases in teachers' associations, expectations, and behaviors.

1.6 AIM AND OUTLINE OF THE DISSERTATION

The general aim of this dissertation is to provide more insight into the role of student and teacher gender and gender stereotypes in male and female students' performance. More specifically, I aim to contribute to literature on representative bureaucracy in public administration by complementing representative bureaucracy literature with elements of social psychological theories on gender stereotypes to unravel distinct mechanisms of representation. In doing so, I provide new insights about the role of context in representation effects and about the individual-level mechanisms underlying representation effects. Additionally, I aim to contribute to the study of gender and gender stereotypes in education more broadly by integrating different streams in the literature to build a theoretical framework on where, when, and how effects of student and teacher gender on student performance emerge. Further, I show the value and suitability of a variety in research angles, methods, and populations to study the role of gender in education. Finally, I aim to contribute to education practice by providing more insight into the often unconscious and unintentional

role of gender and gender stereotypes in education. Thereby, I try to help practitioners to consider how to reduce negative consequences of gender and gender stereotypes in education.

The studies within this dissertation are divided into chapters. Chapter 2 includes the study on the role of educational context in the associations between student-teacher gender congruence and student performance. Chapters 3 and 4 include the studies on an individual-level mechanism from the student perspective. In these chapters, the role student-teacher gender congruence in students' gender stereotypes, self-perceived abilities, and performance is examined. Chapter 5 includes the study of an individual-level mechanism from the teacher perspective. In this study the role of teachers' gender, implicit gender stereotypes, and gender-typed expectations of student performance in gender bias in teachers' grading is investigated. The research model is depicted in Figure 1.4. This dissertation concludes with Chapter 6 in which the main findings of the studies are integrated and discussed.

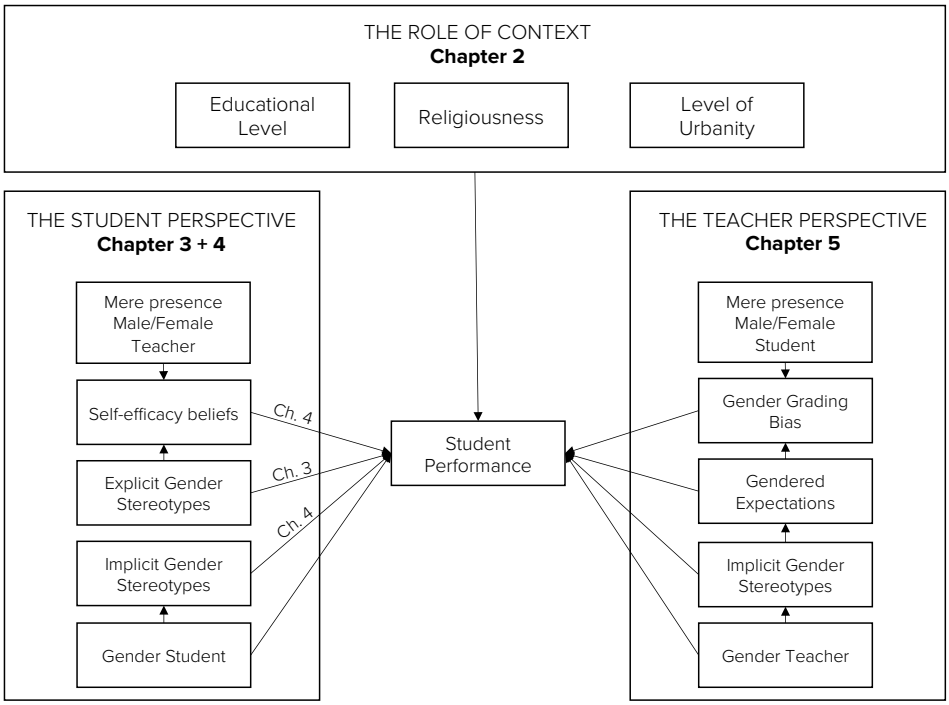
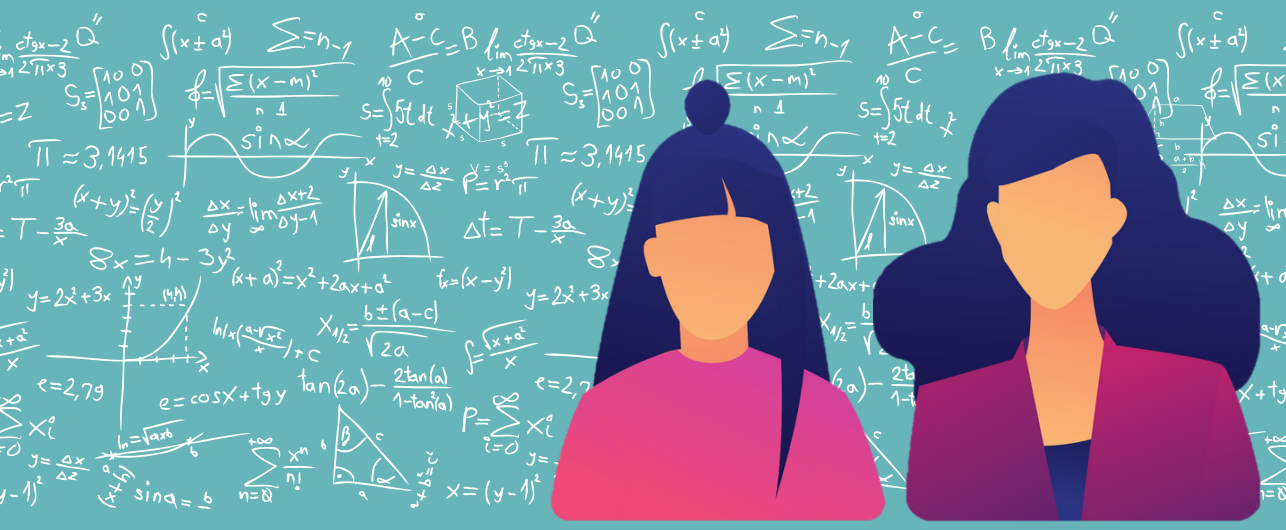
Figure 1.4. Research Model