

# WHERE ARE ALL THE WOMEN AT? INSIGHTS FROM THE DANISH CONSTRUCTION EDUCATIONAL SYSTEM

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Less than 10% of employees in the Danish construction industry are women, and even fewer are in management positions. This paper investigates why still so few women are attracted to an education in an industry with an abundance of career possibilities and a dire need of employees. Do the expectations of traditional gender roles contribute to women turning their backs on the industry or does the system create a self-fulfilling prophecy? Using a mixed-method approach, with 334 responses on three sets of questionnaires and multiple interviews with relevant representatives in the industry, the findings suggest that there is a significant difference in the way male and female Constructing Architect students view women's roles in the construction industry. This becomes apparent when examining one of the leading educational programs for prospective leaders and managers in the construction industry. Thus, showing a systemic blindness that can be traced back through the school system. We can conclude that from the perspectives of the students, the construction industry's reputation is both archaic and discriminatory and can influence the educational choices of women.

Keywords: gender in construction; systemic blindness; higher education; workforce necessity; majority blindness

## INTRODUCTION

The construction industry is facing a significant challenge in attracting female employees. According to a study conducted in 2018 by The Danish Association for Responsible Construction (2021), less than 10% of all employees in the construction industry are women. This underrepresentation extends to both skilled labour, such as carpenters or bricklayers, as well as professional industry roles requiring higher education, such as architects, engineers, and "Constructing Architects". This paper's focus is on the professional role of the Constructing Architects, which is a relatively modern and unique Danish education, that equips students with the skills to become managers, designers, and leaders across many different aspects and functions of the

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industry e.g., BIM<sup>2</sup>- and sustainability managers and by combining architectural and engineering competencies providing a necessary link within the industry.

Construction Architects are graduates with a bachelor's in Architectural Technology and Construction Management (ATCM). Following the conclusions from the study above, it established that only 9% of jobs at (top) management level, in the construction industry, are held by women. This lack of female representation is notable, especially considering that the only job function where women outnumber their male colleagues is general office and customer service work, with women making up 73% of the employees in these roles.

In the same vein, a recent study conducted by Autodesk Construction Cloud (2023:6) revealed that 86% of construction companies in Nordic countries are struggling to recruit professionals, indicating a clear and pressing skills shortage within the industry. Strikingly, the same survey found that only 18% of these companies plan to invest in diversity and inclusion initiatives. If the industry is to attract more female colleagues, this needs to change or as Watts (2007) describes it 'dragging it [the construction industry] out of the dark ages' and into a modern age.

However, the lack of a more gender balanced industry is not limited to the construction site nor the design office, at one of the University Colleges which offers the constructing architect education (ATCM) only 25 percent of enrolled students were female in the summer intake of 2023, which is an increase since the average over the last 10 years has been 17 percent. Furthermore, the female students are not only a minority within the education, but also face a higher likelihood of dropping out of the educational program compared to their male counterparts, looking at the internal data from the University College, the data shows that over the last 5 years (2019-2023) an average of only 34 percent of the female students completed the education, whereas it is 61 percent for the male students.

The University College wishes to address the gender (im)balance, which, has resulted in a project called "Women in construction". Therefore, this study can be seen as a preliminary study in a larger project.

The aim of this paper is to understand whether there is a different perspective, from male and female students, on gender issues within the construction industry. By examining the potential differences in how the students perceive the industry's views on gender, this paper hopes to contribute to the understanding of why so few women choose to pursue an education and career within the field of construction. To gain these insights, the main author conducted three surveys amongst the ATCM students, distributing questionnaires to 590 students from the first to the seventh and final semester.

The result from the surveys is interpreted by exploring the possibility of a systemic blind spot within the industry and the possibility of a self-fulfilling prophecy, furthermore, the study asks the question to support the aim of the paper.

- How are male and female students' perspective on women in construction and are the perspectives different?

This paper draws on literature on the presence of women in traditionally male professions, as well as literature on systemic blindness in the profession and school

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<sup>2</sup> According to Autodesk Building Information Modelling (BIM) is the foundation of digital transformation in the architecture, engineering, and construction industry.

systems from studies done in the Nordic countries and within the UK labour market. Additionally, this paper explores the theoretical perspective of a self-fulfilling prophecy. This exploration is based on how the perceived understanding of initial theories is reflected in the empirical research presented in this paper.

### **Women in Construction**

When examining the broader context of women in the Danish construction industry, a study conducted by The Danish Association for Responsible Construction (2021) reveals that only 9% of industry leaders are women. Additionally, a mere 5% of company owners in the sector are women. Such disparities can also be observed in other Western societies with Piña *et al.* (2021:178) highlighting a systemic challenge, focusing on female managers and company owners in the UK and the barriers they face, such as differentiated pay levels, inadequate career progression, discriminatory selection process during recruitment.

The construction industry is a highly gendered industry as noted in the introduction, where most workers are men. This can potentially create a workplace where female colleagues are e.g., sexual harassed and excluded just for not being a typical image of the industry (Wright 2016). As an example of this every day sexualisation of the workplace can be the nude female calendar that still today is a part of the construction site, a recent study done by The Danish Association for Responsible Construction (2023) shows that 13/20 construction companies have nude calendars hanging in the site huts and tool containers which adds to the image of a male workplace.

Another example of this small scale sexualisation can be inappropriate graffiti on the construction site done by other employees. As a female project manager in a major Danish construction company explained.

"I repeatedly had to ask the contractor to remove a graffiti drawing of a penis that was drawn on the wall in the elevator shaft." Ann-Louise, Project manager.

In summary, the construction industry supports the reproduction of the idea that the construction site is preferably a masculine place and thereby contributes to the highly gendered industry by allowing these types of every day sexualised work environment innuendos.

## **THEORETICAL BACKGROUND**

To understand whether there is a different perspective, from male and female students, on gender issues within the construction industry, we have chosen to interpret the situation from two different perspectives. First, we will introduce the concept of self-fulfilling prophecy (Merton 1968) and next we introduce indirect systemic discrimination (Schindler and Zeller 2011).

### *Self-fulfilling prophecy*

Merton (1968) explains in his novel work - Social Theory and Social Structure that the mere fact that one has prejudices about expected behaviour can perpetuate, e.g., female students or colleagues, minorities, etc. in it and thereby confirm the content of these prejudices and so a self-fulfilling prophecy can be generated. In western culture, an understanding of male and female roles in our society exists, which is formed through our school systems and continues into the workplaces. Dividing gender into boxes, perhaps quite unconsciously can influence the future choices the young person makes, thereby reproducing the stereotypical expectations that society still has for us as human beings.

A recent study from Sweden confirms the theory as Sultan *et al.* (2019) concludes in their paper about “why girls lose their interest in technology” that girls in the age 9-12, although they were not aware of it, confirmed gender stereotypes about girls and technology by e.g., adopting a social identity as not being technical minded. A Danish study done by Frederiksen (2020) supports that conclusion by stating that structural challenges, not least strong traditional gender norms and stereotypes effects how the young girls view not only technology but also STEM (Science, Technology, Engineering and Mathematics) educations in general. Generally, girls in the early school system tend to have negative attitudes toward STEM educations and also appear to have lower self-efficacy as well as lower intellectual and practical interest in STEM field subjects (Virtanen *et al.*, 2015).

In the early school system, research indicates that the teacher's role plays a significant part in relation to the girls' involvement in the more technological activities, and especially the teacher's perception of gender (Frederiksen 2020). This challenge with embedded and systemic gender identities and expectations early in youth, can be dragged along by the young person and play a role in the choice of education that the young person ends up taking, and thereby excluding an education solely based on systemic and biased understandings of what one should be as male or female.

#### *Indirect Systemic Discrimination*

In the literature review, we established how the construction industry exhibits to some degree an indirect systemic discrimination, when it comes to e.g., gender or sexuality and where the “...norms and rules are designed around the attributes of a dominant group, against whom minorities are less able to comply.” Schindler and Zeller (2011: 111).

Scholars such as Watts (2007) and Wright (2016) have pointed out that the dominance of male stereotypes within the industry are based on a male career model with a strict separation of the work life and private/family life. Watts points out two of the most pressing issues in that career model 1) the long-hours culture 2) the conflict-ridden nature of the industry. Powell *et al.* (2018:321) states that the consequences the of adhering to theses unspoken masculine workplace norms of long hours, total availability, and presenteeism affect the wellbeing of the employees.

But also, small barriers or systemic blind spots can be found in daily work situations such as the lack of toilet facilities for women or a missing focus on the difference between male and female work attire, which is shown in the example below. These barriers can lead to the majority blindness, where the majority does not even see a problem or the consequences it creates for the minority.

A female construction site manager needed work attire', just like the male colleagues. In the company, there are affiliated clothing stores, from which the employees must buy clothing, due to discounts etc. Unfortunately, it was not possible for the female construction site manager to find clothes, which fitted her, as the clothes were only intended for men. There were neither blouses nor trousers for women - Signe, construction manager trainee from ATCM education (2023)

In this example, there is a degree of systemic negligence (blindness), as the company, they made the contract with - the clothing company, did not consider the fact that they had female employees, working on the construction site, even though it is a large-sized company with over 700 employees and a turnover of more than £300 million.

There are of course examples of much more improper and direct systematic harassment on construction sites, but the point of the selected examples is that they

support the narrative that things are done on the part of the majority, which daily and most often unconsciously emphasizes the masculine dominance on the construction site.

## **METHOD**

The study employs a mixed methods approach, utilising both qualitative and quantitative primary datasets. The aim of this paper is to understand whether there is a different perspective on gender issues within the construction industry between male and female students. Therefore, the study design is strengthened by a mix of open and closed questions to understand ‘why’ and not just ‘how many’ (Creswell and Creswell 2018). A secondary dataset, where unstructured interviews were conducted, is also used to further investigate and support the ‘why’.

The main author collected the empirical material for the study, in the fall of 2023 and then again in the spring of 2024, the design is based on two types of questionnaires. The object of this study is the students enrolled in the ATCM education at the University College.

The first type of questionnaire focused only on the first semester, due to de fact that they have little or no experience within the construction industry and therefore their understanding of the industry presumably aligns closer to that of the young person choosing their future education. The questionnaire contained both open and closed questions to produce richer insights into the participants understanding and view on industry (Braun *et al.*, 2021). To limit the bias or influence by classmates or lecturers, the questionnaires were distributed during the first couple of weeks of studies.

The first questionnaire type was designed with simple questions and with personal handouts by an Associated Lecturer to ensure a high response rate. In 2023 three classes participated and in 2024 the survey was reproduced and distributed to two first semester classes using the same method, but with one additional question, in all 150 students were given the opportunity to answer and 131 students handed in the fully completed questionnaire. The handed-out questionnaire (only first semester) was composed of closed questions such as their professional background or affiliation (e.g., bricklayer, carpenter, technical student, etcetera) or gender (female, male or other). Then followed a series of open-ended questions, where the informants were asked to provide an answer to the question in their own words.

A digital survey was conducted in the fall of 2023 and sent out to all students attending the ATCM education to gauge whether students’ view of the industry shows a progression. The survey was distributed to 440 students, of which 203 participated.

In total 334 students participated in the survey.

Both the handout and the digital questionnaire consisted of 14 questions based on three different themes. In the digital questionnaire all questions were closed ended for statistical purposes. These questions were structured around the following themes 1) general information about the informant such as age or gender 2) the students view on the ATCM education (but also competing educations such as engineering and architects) 3) the students view on the construction industry from a novice's perspective.

Also, unstructured interviews (Creswell and Creswell 2018) with professionals within the industry and with 7th. semester female students were conducted to gain empirical context into the experience with the construction industry beyond the educational

frames. In total 4 interviews were done, firstly with two students, who had just finished their 20 weeks obligatory internship in the 6th semester, as construction managers. Then a project manager and lastly the head of a construction management department in a large Danish engineering firm.

However, this method of analysis has several limitations, due to the nature of data primarily provided through questionnaires and analysed qualitatively.

All following data is based on students attending one University College which is one of six University Colleges in Denmark, which offer the ATCM education. Thus, the empirical findings can only provide an indication of the truth or as Braun *et al.* (2021:643) states gaining rich(er) insights into the topic of interest, and not “...achieves statistical representativeness...” or “...allows simple claims of generalisability.”.

## FINDINGS AND DISCUSSION

The response rate especially on the handouts in the first semester is high and significantly lower on the digital questionnaire for all semesters.

Table 1: types of questionnaires

	E23	E23	F24
Population	1. semester	All semesters	1. semester
Methodological understanding	Quantitative/ qualitative	Quantitative	Quantitative/ qualitative
Type of questions	Open/closed	closed	Open/closed
Total number of students, within the population	99	440	51
Numbers of responses	85	203	46
Female students answering part or all of the questionnaire	19	47	10
Male students answering part or all of the questionnaire	66	156	36
Answer percentage	86%	46%	90%

Most answers to the second questionnaire were obtained in the 3rd and 7th semester.

23% female and 77% male students answered part or all of the questionnaire., compared to the average percentage of female students, which is 20% of the current student population, more female students than male students have answered the questionnaires, if you compared to the normal composition of students based on the gender.

On the two most essential questions "Do you think the industry looks down on women?" And "Do you think women have to work harder in the industry?" the answers were surprising.

As the figure 1 shows there is a different view when it comes to the question of ...if the industry looks down on women? The data is based on data from 334 respondents from the 1st to the 7th semester. 53% of the females respond that they think that the industry looks down on women whereas it is 21% of the male respondents that think so. This tells us two things 1) 53% of the women in the ATCM education are pursuing an education for an industry they think looks down on them. 2) this opinion is not shared to the same extent by the male respondents.

Looking closer at the comments from the questionnaire in the first semester. The female students say "... expect to experience more resistance, as well as being rejected compared to the boys." or "...it is the norm that men belong in the construction industry.". These statements show that to some degree women has an understanding that they are less welcome in the industry.

Figure 1: Answer in percent to the question "Do you think the industry looks down on women?"

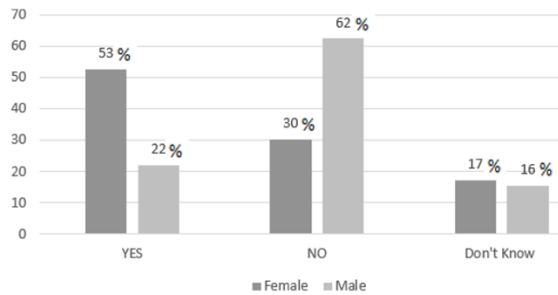
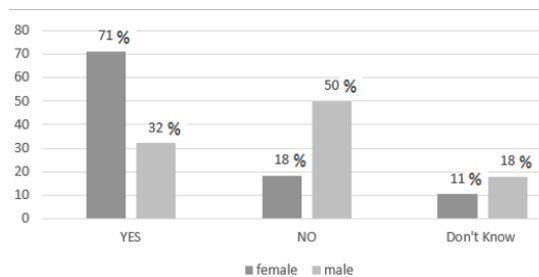


Figure 2 shows the same pattern, with a clear difference in the way male and female students answer, in total 71% of the women answered that they think they must work harder than their male colleagues. The data is based on 334 answers to the question "Do you think women have to work harder in the industry, than men?" from the 1st to the 7th semester.

Looking closer at the comments from the questionnaire in the first semester. The female students say, "I think you have to work harder as a woman to be recognised." and "...because it is generally a male-dominated industry" or "there is a mentality in the industry that men know best".

Figure 2: Answer in percent to the question "Do you think women have to work harder in the industry, than men?"



The data illustrates that there is not much difference between the answers from 1. semester and the other semesters. which indicates that there is a persistent perspective, from the female and male students, on gender in the construction industry.

In this paper, we contribute with an empirical finding on how two groups of students, male and female, view women in construction. We set out to answer the question.

- How are male and female students' perspective of women in construction and are the perspectives different?

Firstly, based on the analysis of the data provided by 334 students, it is possible that the male students, representing the majority, do not recognise the same issues as their female counterparts. Secondly and as a logical extension to the first finding, the female students representing the minority of the students, do not recognise the same issues as expressed by the male students. Consequently, from a student perspective, the male students do not see an industry looking down on women and do not think that female coworkers need to work harder than their male counterparts, which is in direct opposition to the point of view of the female students.

We can elaborate on the empirical findings by interpreting the findings with the established theory. Theory and interviews done in this study with female

professionals within the industry, tells us that there is a distinctly male working environment, with some systemic blindness or neglect towards the integration of women on the construction site.

Watts (2009) describes such a situation as a kind of cultural nursery for the male breadwinner model with a built-in defence system. Furthermore, Powell *et al.* (2009) argues, that when women are accepted in a traditionally male work environment, they are often subjected to displays that characterise the community of men, e.g., the previously mentioned nude calendars or sexist drawings, etc. which they can either protest or accept by "undoing" their gender, as Powell and colleagues describe it and thereby transforming into one of the 'boys' and being part of the masculine system, at the cost of turning against the 'girls' (Wright 2016:354).

Secondly, examining the students' responses through the lens of Merton's (1968) theory of self-fulfilling prophecies, we must consider whether the female students are indeed shaping their future choices and rejections based on their bias about the industry. It can be argued (based on a small number of respondents, only the first semester in the spring of 2024) that there is an awareness among the female students that the industry is exclusionary, and this has repercussions, as women refrain from pursuing a career in construction. As many as 70% of the female students in the first semester responded, 'yes' to the question 'Do you think women are consciously not choosing a career in the construction industry?' (a follow-up question based on figures 1 and 2).

Interestingly, Denmark is widely recognised as one of the most gender-neutral countries globally, according to the SDG Gender Index 2022 by Equal Measures 2030. This only further strengthens the question of why women are still significantly underrepresented in the construction industry, especially when the sector has repeatedly emphasized the current and growing labour shortage (Autodesk Construction Cloud, 2023; Ministry of Children and Education, 2022; National Economic Council of the Labour, 2021).

There are success stories within the Danish construction industry, e.g., the biggest consultant in Denmark - Ramboll has been able to change the number of female construction managers from 5% to 28%, within the last 5 years, according to the head of the department of Construction Management. This was achieved by focusing on the culture and values such as empathy, integrity and a "good tone" which all help creating a good work environment within the departments. This success is not without concerns as research shows that being hired because of your gender can have negative consequences such as making one doubt one's own abilities Powell *et al.* (2009). Therefore, it is essential for the companies to focus on the work environment and values and not solely reduce gender to quantities.

However, we continue to question whether the contrasting responses are a result of preconceived notions that our female students bring with them as bias from an embedded understanding of the industry formed by a collective public narrative creating a self-fulfilling prophecy, or do the male students display a sort of majority blindness towards the problems which the construction industry exposes their female colleagues?

As explained earlier this preliminary study focuses on the students of one University College and especially on the first semesters. But the result is surprising as earlier research has concluded that "... students..., seem reluctant to accept that gender inequality exists..." Durbin and Fleetwood (2010:221). This raises an interesting

question, if these female students willingly have chosen to enter an industry thinking that they are looked down upon and need to prove themselves by working harder than their male colleagues. What about all the women outside the institution, how do they view the industry and are that understanding of them needing to work harder and not fitting in, one of the reasons for them not choosing to pursue an education within construction and thus, creating a self-fulfilling prophecy as (Merton 1968) describes that the mere fact that one has prejudices about expected behaviour can perpetuate and thereby confirm the content of these prejudices. We suggest further research into this area to fully understand if and how the female population's views the construction industry and how it influences their choice of education and ultimately choice of career. The authors of this paper, hope this question will be further explored and elaborated in future research.

The construction industry cannot afford to exclude half of the workforce in the population and both the theoretical and empirical data suggest that the exclusion is largely based on traditional, systemic views on gender in work contexts in society at large. Therefore, a pressing recommendation can be drawn by looking at the results of the study. Where we as a higher learning institution, but also looking at the industry, need to focus more on the perception of the industry, which young people, especially women, have, as the industry is seen as an exclusionary and traditionally masculine industry, which can lead to negative consequences for the influx of future employees. Therefore, it is problematic when companies, according to Autodesk Construction Cloud (2023), only to a minor extent invest in initiatives that support diversity and inclusion, this needs to change!

## **CONCLUSIONS**

The aim of this paper was to understand whether a contrasting perspective on gender exists amongst future employees in construction. Based on the answers from participating students, it is evident that there is. When we examine the findings and compare them to the answers to the supporting questions, we can say that there are no indications that the male students knowingly disparage their female counterparts, but both theory and interviews indicate that the work environment within the construction industry, with a predominant male work environment to some degree reproduce an understanding of what and how the employees of the construction industry act and look like.

We can conclude that the industry's reputation amongst our female students is both archaic and discriminatory and impacts their educational choices and to some extent helps to create a self-fulfilling prophecy, it can also be said that there is a degree of systemic discrimination based on traditional understanding of the industry and how to act within the construction industry.

This paper contributes to the growing body of literature on gender inequality within the field of construction, and as presented findings that bring new understandings regarding the early choices of pre-students that are to some degree based on the perceptions of the industry. From the authors perspective, if we are to move forward as an industry, the need to understand the past is essential to trying to change the present.

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