Girls’ Perceptions of the Construction Industry: Building a Picture of who isn’t Interested in a Career in Construction and Why

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As an Industrial Designer, I spent a number of years working in the sheet metal industry and commercial fit-out, before embarking on a career researching housing and building trades – specifically home modifications. In the sheet metal industry, I was one of very few women (and often the only woman) on the factory floor or on site installations.

Since completing my PhD in 2016 I have taken on a role of Senior Research Fellow in the School of Built Environment at UTS. I research the impact of the built environment and technology on wellbeing, particularly of older people and people living with disability.

When working with industry in the field of home modifications, I find that I am working alongside many women; however, all are represented in the community caregiving fields as they relate to ageing in place. In contrast, the builders and landscapers performing the built environment work are all men. I am challenged by the simplistic notion that women choose ‘caring roles’ and men the ‘providing’ roles. I know from my research that our built environments have a significant impact on our health and wellbeing. With a daughter who has just started high school, I am keen to understand why girls don’t gravitate towards careers in the relatively well-paid and growth industry of construction/trades.

I am immensely grateful to the National Association of Women in Construction (NAWIC) and the scholarship’s key sponsor CULT Design for this scholarship. Through this research I hope to shed light on ways of supporting girls to visualise the potential of a career in construction and to realise themselves in these roles. My intention is for the outcomes to contribute to the removal of industry barriers that prevent women from aspiring to a career in construction professions.
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“I just can’t see myself in the construction industry. Maybe I could be an architect but what else is there?”
# Table of Contents

FOREWORD .......................................................................................................................... 2  
ACKNOWLEDGEMENTS ........................................................................................................ 3  
TABLE OF CONTENTS ......................................................................................................... 4  
EXECUTIVE SUMMARY ....................................................................................................... 6  
SNAPSHOT FINDINGS ........................................................................................................... 7  
RECOMMENDATIONS ........................................................................................................... 8  
INTRODUCTION ..................................................................................................................... 9  
............................................................................................................................................... 10  
RESEARCH AIM .................................................................................................................... 10  
RESEARCH QUESTIONS ......................................................................................................... 11  
WHAT WE KNOW ABOUT WOMEN, GIRLS AND CONSTRUCTION? ................................. 11  
   Influence of Teachers and Parents ...................................................................................... 14  
PROBLEM SUMMARY .......................................................................................................... 15  
RESULTS STAGE ONE INTERVIEWS ................................................................................... 16  
   SUMMARY .......................................................................................................................... 16  
   THEMES ............................................................................................................................. 17  
   THEME 1: CONSTRUCTION CAREERS ARE NOT ON THE RADAR .................................... 17  
   THEME 2: INABILITY TO VISUALISE THEMSELVES IN THE CONSTRUCTION INDUSTRY: YOU CAN’T BE WHAT YOU CAN’T SEE .......... 17  
   THEME 3: NEGATIVE PERCEPTIONS OF MALE-DOMINATED WORKPLACES .................. 18  
   THEME 4: A JOB IN CONSTRUCTION WOULDN’T BE AIMING HIGH ENOUGH ...................... 20  
   THEME 5: PARENTAL INFLUENCE ...................................................................................... 20  
   THEME 6: JOB QUALITIES ................................................................................................. 21  
   SUMMARY .......................................................................................................................... 22  
A POSITIVE NOTE ................................................................................................................. 24  
STAGE 2: RESULTS UTS DATA: BACHELOR OF CONSTRUCTION PROJECT MANAGEMENT ..................................................... 25  
   ANALYSIS OF MAIN ROUND OFFERS, ENROLMENTS AND GRADUATIONS BY GENDER .......................................................................................... 25  
   ANALYSIS OF MAIN ROUND OFFERS BY CURRENT SCHOOL LEAVER STATUS ............... 27
EXECUTIVE SUMMARY

This report presents the findings from recent research investigating the perceptions of the construction industry by female high school students. Despite continuous calls to reform the gender imbalances within the construction industry, the number of women entering and remaining in the sector continue to sit way below parity. This research steps outside the industry’s organisational walls and explores how construction is portrayed and perceived by the very women it hopes to attract, and where these women come from. Previous research has interviewed female students who had already enrolled in a Construction Management course, but there is a lack of research into the reasons why female high school students are not going down this path. This report explores high school girls’ perceptions of the construction industry. It also analyses university data on female students who are interested in a career in construction. This combined data reveals both the perceptions of the industry, and where interest in the industry is coming from, both important contributions when addressing the imbalances in the construction industry.

The research has revealed that in the sample of high school girls interviewed (N:10), the construction industry is not appealing because of its perceived exclusivity and gender imbalance. The participants also felt that the only women they see in the industry are the generally young women holding the lollipop signs and directing traffic. Interestingly, most of the participants expressed that their parents would not want them to embark on a career in construction – wanting them to ‘aim higher’ given their school education at a high performing, all-girls independent school. Only one participant had a member of their family working in the construction industry and no participants had a full awareness of the potential for the construction industry, or had considered it as a career.

Data from the UTS Bachelor of Construction Project Management (BCPM) degree was analysed over a 9-year period (2010-2018). The results indicated that in fact most offers to women applying to do this construction course are made to non-school leavers, however their age and where they are coming from remains unknown and warrants further investigation. At UTS at least, women receiving main round offers to undertake the BCPM are over-represented from independent, all-girls schools.

The results of this exploratory project align with current Australian research on the nature of barriers to gender balance in careers (e.g. awareness, exposure, parental influence). However, because of its small sample size and being limited to a single school and single university, the results are not generalisable and warrant further explanation through a larger study.

“ I DON’T SEE MANY GIRLS ON CONSTRUCTION SITES THAT DO MORE THAN HOLD UP LOLLIPOP SIGNS. THE GIRLS JUST DO THE TRAFFIC CONTROLLING ”
SNAPSHOT FINDINGS

Data from interviews with female high school students (Year 11 at independent, all-girls school).

- High school girls interviewed could not visualise themselves in a construction career. They commented that it had not been suggested to them by school, teachers or parents.
- The students did not see a career in construction as an aspirational career in STEM. Engineering however, was seen as an aspirational STEM career.
- The language of STEM is bypassing the construction industry. Initiatives that use STEM language to increase female participation are unlikely to be recruiting for the construction industry.
- There is a lack of visible, female champions in the construction industry. High school students do not see successful females in construction.
- There is a lack of understanding about the diverse scope of jobs/careers that comprise the construction industry.
- Parents’ perceptions of the industry are influential in steering students away from the industry.

Data on Bachelor of Construction Project Management Degree at UTS

Analysis of the main round offers, a measurement of interest in a career in Construction Project Management, revealed that:

- The majority of females (55%) who received a main round offer into the course between 2010 and 2018 were not current school leavers e.g. mature age.
- 55% of girls offered placements in the UTS Construction Project Management Degree as school-leavers come from all-girls high schools – while only 9% of schools in the entire state of NSW are all-girls schools. It should be restated here that the data is too small and limited (a single university) to make any inferences about cultural or gendered reasons for this; however, it does highlight an opportunity to better understand where the girls are enrolling from to target and tailor recruitment and education strategies to students, parents and schools themselves.
- The average Index of Community Socio-Educational Advantage (ICSEA) ratings of the schools receiving main round offers is 108 which is close to the national average (1000). The ICSEA score gives an insight into the socio-educational backgrounds of students. The distribution of ICSEA scores across genders is equivalent.
RECOMMENDATIONS

The public face of the construction industry.

- Construction needs to reposition itself as a career for both women and men. The construction sector’s employer groups and leading companies should undertake a campaign that rebrands construction as an aspirational career. Students, parents and schools need to be convinced.
- The industry needs diverse role models and champions to communicate the potential and diversity of roles within a construction career.
- Further research into the role that schools play in supporting careers in construction for girls is recommended. This will enable a better understanding of how schools can be better informed about opportunities within the construction industry for all female students, across all levels of academic achievement.
- The construction industry should be encouraged to review its recruitment practices to include non-school leavers – warranting further research into exactly where interest in construction training comes from and how it can be encouraged from an early age. Further research is needed into how construction training and tertiary education is marketed/targeted to understand why particular schools are drawing more interest.

“\nI CAN’T SEE MYSELF DOING CONSTRUCTION AT ALL. I FEEL LIKE I WOULD BE INTIMIDATED.\n“
INTRODUCTION

Despite its prominence, construction remains Australia’s most male-dominated industry, with the lowest representation of women of all industry sectors. In the decade between 2006 and 2016 women’s representation reduced from 17% in 2006 (ABS, 2006b) to 11% (ABS, 2016). At every career stage - recruitment, retention and progression - men vastly outnumber women.

Australian research undertaken at UNSW (Galea, Powell, Loosemore & Chappell, 2018) worked closely with construction companies to examine the organisational values, processes and structures, both formal and informal, that support or hinder gender balance in the construction industry. This research made clear recommendations to reform the industry from within. This research examines why reform might also be needed outside the organisational walls and explores how the industry is perceived by female students. It also examines where people are coming from when recruited into the industry.

In part, the gender imbalance in the construction industry has been levelled at consistently low female enrolments in construction training and tertiary education courses. In the 10 years between 2007 and 2017, women aged 18-64 years were outnumbering men in their participation in education (studying for a qualification). Looking specifically at school leavers, ABS (2017) data reports that 86% of females and 82% of males aged 15–19 years were studying for a qualification in 2017, and 13% more women than men had attained a bachelor’s degree.

Women have been the majority gender of Australian university students since 1987 (Department of Education and Training 2014). This majority of female students continues across all fields except for building and construction-related degrees, where men consistently and significantly dominate student enrolments and completions (Australian Government, 2015). The reasons behind this have only recently begun to be explored but tend to research female students who already find themselves on the Construction Management pathway. Work by Bigelow, Saseendran & Elliot, (2018) found that students in Construction Management of both genders identify the good career prospects as well as the availability of internships and work experience. Australian research by Oo, Li and Zhang (2018) interviewed female Construction Management students at UNSW and found that they considered the course because of a family member or an awareness of career opportunities. In the US, female students were found to be influenced to enrol in Construction Management programs through their fathers, awareness of construction career opportunities, internships and work experience (Bigelow, Bilbo, Matthew, Ritter, & Elliott, 2015). There is a lack of research exploring what factors are preventing high school girls from considering the construction industry as a career option. This research responds to this question by:
• Synthesising current research on school girls, tertiary education and construction careers.
• Interviewing female Year 11 students to get their perspective on the construction industry.
• Analysing UTS enrolment data on the Bachelor of Construction Management.

A number of assumptions/misconceptions about the reason why girls historically did not choose male dominated industries – that they were not competent or more recently, not confident, continue to be disproven – Fitzsimmons et al’s (2018) most recent large study revealed that girls and boys have equal confidence levels at school. This research is an exploratory pilot study, and it is hoped that a larger, longitudinal study can be undertaken to better understand how to strategise the recruitment and retention of women in the male-dominated construction industry.

RESEARCH AIM

The aim of this exploratory research is to contribute to an understanding of how to recruit and retain women in the male-dominated construction industry. It builds evidence relating to high school girls, their future careers and the construction industry. The research undertakes a mixed methods approach – a mix of interviews and university enrolment data.

This project focusses on a university pathway into the construction industry despite acknowledging that there are diverse pathways into the industry. It does this for a number of reasons – firstly there was a clear expectation from within the interview sample that university was an assumed pathway into a career. Secondly, similar explorations have been undertaken into the trades with work such as Struthers (2016) examining students, educators and adults and their perceptions of construction trades. Struthers concluded that change will depend on systemic and enduring strategies that are properly funded, improvements in awareness of the industry, and benefits of reduced segregation. Indeed, the same properly funded, systemic and enduring strategies are needed at all entrance points into the industry – including trades and management.
RESEARCH QUESTIONS

• How do girls perceive the construction industry as a career option?
• What does the analysis of Construction Management enrolments at UTS tell us about the gender, schools and pathways for girls?
• How might this data inform future recruitment initiatives for the construction industry?

WHAT WE KNOW ABOUT WOMEN, GIRLS AND CONSTRUCTION?

The construction industry and the gender imbalance of its workforce has been the subject of discussion for a number of decades (Gale, 1994; Agapiou 2002; Worrall et al 2010). The most recent ABS data from September 2018\(^1\) shows that the construction industry remains the most male-dominated industry in Australia – with only 12% of the workforce being women. The percentage of women amongst CEOs of construction firms are even further under-represented - 7.4% in 2011 (Tharenou 2016). The construction industry has now replaced Rental, Hiring and Real Estate Services as the Australian industry with the second-highest gender pay gap at 29.4% ($39,950) behind financial services\(^2\).

Australian research continues to examine strategies for equal employment (French & Strachan, 2018) and to find ways of breaking down gender structures within organisations (Galea et al 2018).

A number of barriers have been identified across over a decade of academic literature:

- The construction industry’s image.
- Career knowledge amongst children and adults, selection criteria and male dominated courses.
- Recruitment practices, procedures and progression.
- Exclusionary and sexist attitudes, behaviours and work practices.
- Male dominated culture and the work environment. This includes:
  - Inflexible work conditions and long hours made worse by practices of presenteeism and resistance to flexible work arrangements; and

\(^{1}\)http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4125.0~Sep%202018~Main%20Features~Economic%20Security~4

Addressing these barriers requires a multi-channelled approach. The research by Galea et al (2018) made a number of recommendations to break down gendered structures and improve working conditions for both women and men working in the industry. In addition to examining the industry itself and those who are already working in it, another approach to reforming the low numbers of females is to look at future workforce needs and how to attract more women into the industry. To address this, it is necessary to look at education and training.

In the university sector in Australia, females account for 58% of all domestic student enrolments (Larkin 2018). In fact, women have been a majority of university students since 1987 (Norton & Cherastidhham, 2018).

The number of women students exceeds the number of men in all fields of education except for information technology, engineering and architecture and building (Australian Department of Education and Training 2016 data). Understanding what is driving girls’ tertiary education and career choices in directions other than the construction industry is an important informant to recruitment practices into the industry.

Construction Management (CM) courses, their gender imbalance and what attracts students has been the subject of international research in the past decade. Most of the research conducted has come out of the US. Early US research into CM students of both genders found that students are attracted to the course because they have an interest in construction and wanted to be “hands-on”. The high school Careers Counsellor was the least influential person in guiding their careers (Koch, Greenan and Newton, 2009). This same paper reported low levels of female enrolments (9%). More recently, US research explored the experiences of female CM students, and found that the most effective factors in attracting female undergraduate students to CM courses were the offering of internships and awareness of opportunities (Bigelow, 2015). US research (Del Puerto et al. 2011) explores strategies for attracting and retaining female Construction Management students but surveys the opinions of the Faculties/Schools and not students directly.

Researching the pathways and influences of women who have already chosen CM training is important knowledge. But so too is understanding the perceptions of girls who are yet to choose their university training. There is little research that examines high school girls’ experiences and perceptions of the construction industry prior to university education. Important Australian research has however been conducted by Dr Karen Struthers, who
studies high school students’ (a majority of girls) perceptions of the trades (construction, mining and energy). Struthers reported that gender segregation of the trades can be attributed to gendered assumptions about innate skillsets which are reinforced by parents, peers, teachers and employers.

A majority of the research into the experiences of high school students examines how they perceive themselves in terms of Science Technology Engineering and Maths (STEM) related fields (Tan et al. 2013), particularly in relation to Science (Archer et al. 2013; De Witt & Archer 2015).

**High School Interventions - Construction**

Interventions have been trialled internationally at a high school level to encourage girls’ participation levels in construction. Some examples (not an exhaustive list) include:

- Construction Skills Queensland (CSQ) Construction Program Ipswich (AUS)³
- Supporting and Linking Tradeswomen (SALT) (AUS)⁴
- Industry partnerships such as Monte Sant’ Angelo Mercy College and Laing O’Rourke (AUS)⁵
- Women in Construction Management Summer Institute (US)⁶
- ‘Mentoring a Girl in Construction’ (MAGIC) camp in Washington (US)⁷
- Build like a Girl (US)⁸
- Girls only construction class (US)⁹

Despite this investment in interventions, there is little understanding of their wider impact. In order to understand whether an intervention will be more widely influential in increasing recruitment of women, we need to find out what high school students are currently thinking; their knowledge and perception about the construction industry and where a career in construction could lead.

³ [https://www.csq.org.au/](https://www.csq.org.au/)

⁴ [https://saltaustralia.org.au/](https://saltaustralia.org.au/)


⁷ [https://mentoringagirlinconstruction.org/schools-%26-interest-forms](https://mentoringagirlinconstruction.org/schools-%26-interest-forms)


⁹ [https://hechingerreport.org/girls-only-trade-classes-are-spreading-and-upending-stereotypes/](https://hechingerreport.org/girls-only-trade-classes-are-spreading-and-upending-stereotypes/)
Delving deeper into the reasons behind career preferences of boys and girls at school offers the opportunity to improve strategies and improve the gender balance in male-dominated careers such as the construction industry.

The main hurdles in getting women to study engineering occur long before they reach college, and those that make it that far often have had a role model engineer like a brother or close family acquaintance to introduce them to engineering.

(Wolcott, 2001)

A study of over 10,000 Australian students undertaken by the University of Queensland and the Australian Gender Equality Council found that there were no differences in self-confidence between girls and boys in gender-segregated high schools (Fitzsimmons, Yates & Callan, 2018). This research has used single sex schools as its data pool. This was intended to act as a control for the potential effects that co-education may have upon the self-confidence of girls.

The Fitzsimmons et al. (2018) study surveyed students at top performing boys’ and girls’ schools in Queensland. Students in the study had fixed and gendered ideas of their career direction. The study led by Fitzsimmons revealed patterns of increased self-confidence including the opportunity for leadership roles and leadership development, travel, and having a part-time job. Some findings from the study that are relevant to this research project include:

- Confidence levels are not different between girls and boys at school.
- Girls’ and boys’ top 3 reasons for wanting to work are identical. These reasons are: having a secure job and income; enjoying the tasks I work on; using my talents.
- Girls do rate wanting to help more highly than boys.

Influence of Teachers and Parents

Although career is an expression of self, students are externally influenced in their decisions by peers, teachers and parents. Research conducted by Amamani et al. proposes that self-esteem of the student and types of parental engagement interact in sophisticated ways to generate career adaptability and persistence.
US research reports the important role that teachers play in influencing students into STEM career paths (Faitar 2013). More locally, Australian research by Francis and Prosser (2013) considered the potential for career counsellors to attract students to a career in construction but reported that most career advisors have little knowledge of the construction industry and tend to direct male students to it.

Parents too have a significant influence on their children’s career choices and development. Parents can give children the resources and know-how to engage in career exploration (P. Guan et al., 2016; Y. Guan et al., 2015), make career decisions (Ginevra, Nota, & Ferrari, 2015; Restubog, Florentino, & Garcia, 2010) and build career optimism (Garcia, Restubog, Bordia, Bordia, & Roxas, 2015). Influence can also be exerted through pressure and expectation, or through a transferral of attitudes and values (Fouad et al., 2008).

Problem Summary

Women are under-represented in the recruitment of construction industry courses and vocational training and are not choosing construction industry university training, despite female student numbers dominating the university sector in almost all other education fields. There has been limited investment in interventions and programs designed to encourage high school girls into the construction industry and trades however, there is little knowledge of their effectiveness and continuing low female participation rates suggest that investment in this area has not been substantial enough to produce a shift.

In order to support future high school level interventions to encourage participation in the construction industry and to understand how to target recruitment, this research seeks to provide a better understanding of how girls perceive the construction industry and what, and who, is influencing their decision to not choose a career in this sector.
RESULTS
STAGE ONE INTERVIEWS

Summary

Year 11 girls studying at a Sydney all-girls high school were recruited for 1 hour interviews to explore what influences their decision on a career path and their perceptions and biases of the construction industry as a potential career option. The results of these semi-structured interviews are analysed and presented in this report thematically.

The interviews provided a fascinating insight into the career goals and industry perceptions of a group of girls preparing for their Higher School Certificate in 2019. The participants self-selected based on an interview on careers, and not to discuss construction. Their opinions given about the construction industry are frank, but based on the current evidence, not surprising.

None of the participants had any experience of the construction industry. None of the participants could see themselves in a construction career. They cited reasons such as not prestigious enough, too labour-intensive and fear of not being respected or listened to. Their perceptions of other women in the construction career were limited to ‘lollipop’ holding and traffic management, with many stating that they do not know any women at executive levels in the construction industry and could not visualise themselves or their friends achieving in the sector.

The interview data was analysed thematically into the following areas:

- Lack of awareness: construction is not on the radar.
- Unable to visualise themselves in the industry.
- Negative perceptions of a male-dominated industry where women won’t be listened to, heard or respected – with a perception of limited career success and enjoyment.
- A job in construction wouldn’t be aiming high enough
- Parental influences.
- Job qualities.
Themes

Theme 1: Construction careers are not on the radar

Participants had very little knowledge of the construction industry and its potential career options. The fact that it is a growth industry and one of Australia’s three largest industries was also unknown. Interestingly, engineering is more visible and something that is aspired to, the school has actively run camps and courses to inspire and support girls with an interest in STEM - particularly engineering.

A lot of girls at this school want to be engineers. But I don’t want to be an engineer. There are still not many women doing engineering and there is a really big push by universities as there are still not very many women in engineering. There are lots of scholarships being offered. Participant 3

Construction however, is not in the lexicon as an aspirational career for these high achieving female students.

Why would I want to be in the construction industry? No one would listen to me because I am a girl. Participant 2

I would be VERY surprised if any of my friends went into the trades or construction industry. I would be supportive if they were happy though. Participant 3

Theme 2: Inability to visualise themselves in the construction industry: you can’t be what you can’t see

None of the participants had ever spoken to a successful woman with a career in construction and could not visualise themselves in a construction role. McCartney’s (2018) research also raises the issue of not having visible female instructors/teachers.
I don’t see many girls on construction sites that do more than hold the lollipop signs. The girls just do the traffic controlling. 
Participant 10

There are not many successful women in construction. 
Participant 2

There are no women I know who are doing it at a high level – I don’t aspire to it at all……I can imagine being an architect though. 
Participant 3

Theme 3: Negative perceptions of male-dominated workplaces

A majority of participants (6 out of 10) expressed a negative opinion of the construction industry. A number of participants expressed the concern that they would not be respected or heard.

I am not attracted to that industry because it is so male-dominated. 
Participant 2

I would never want to go into construction. Participant 1

I would be worried that I would not be respected in the construction industry. Participant 4
I want to know that what I go into the people there are going to respect me. I would want equal chances of getting a promotion if there was a man standing next to me. Participant 7

I think boys are a bit more assertive and I am a quiet person and I think I would struggle to get my ideas across. Participant 2

I can’t see myself doing construction at all. I feel like I would be intimidated. I feel like I would be pushed over, if someone tells me I am doing something wrong I will back off. My parents want me to stand up for myself a bit more. I think I am not very good at negotiating. I don’t think the culture of construction would be good for me. Participant 9

Girls….. when we go into high school we are not exposed to that kind of work – hands-on trades, wood work. If we do, do woodwork it is making a jewellery stand or a clock. This is good but we don’t have a bigger scale or impact in mind. We are not geared to the built environment. Participant 6

I think at school we don’t think of the construction industry as being a range of roles. It is on-site and it is bricklaying. We have no concept of a range of roles outside. Participant 6
Theme 4: A job in construction wouldn’t be aiming high enough

There was a perception amongst many participants that construction was not prestigious enough a career or aspiration given the education they were receiving. Engineering however, was highly regarded and the participants acknowledged that there was a big push from universities and schools to recruit engineering students.

My parents have paid a lot of money for us to be here and there is an expectation that we will aim high. Participant 8

I am interested in doing good for society and helping people. Construction would not give me that opportunity. Participant 7

I would be surprised (if my friends went into construction) and I would assume that because we are at a high performing school that all the girls would be aspiring to big high performing careers and that is not the perception of the construction industry that I have. Participant 4

I need to aim higher than a hairdresser or plumber. Participant 5

Theme 5: Parental influence

It was clear from the interview data that the influence of parents was significant. Overall, participants had very little experience of the construction industry. Out of the ten girls interviewed, one parent was a plumber. Other parents of participants ranged in profession from doctor, accountant, musician, teacher, writer, business consultant and at-home carer.
There was evidence in the interviews that parents clearly influence their children in which career directions are acceptable.

My mum wouldn’t think this was a good idea. Participant 4

Money isn’t a thing for me…….But my dad said that primary teaching doesn’t pay enough. Participant 4

Interestingly, there were often contradictions in participants’ statements about their parents’ level of influence. For example, one participant spoke about how encouraging her parents were, and that they wanted her to do whatever she wanted, but then a few sentences later expressed that she knew her parents would not find construction an acceptable career choice.

My mum and dad want me to do whatever I want to do. They encourage me …….Our parents want us to aim high and construction would not be acceptable I don’t think. Participant 6

Theme 6: Job qualities

Participants were asked what qualities they value in a career. Respondents gave the following answers (ranked from highest ranking response to lowest ranking response):

- Job fulfillment/enjoyment
- Autonomy
- Flexibility
- Helping/ doing good for people
- Money/stability

I am interested in doing good for society and helping people. Construction would not give me that opportunity. Participant 3
Money is definitely important because I have grown up in a very good lifestyle so I want to be able to continue that and not be reliant on anyone else – especially if I am to live in Sydney or Melbourne.

You need a good job to support yourself. Participant 8

I want something I am passionate about and something that I am not bored with. I don’t want to say I made a mistake. Participant 10

I want to know that what I go into the people there are going to respect me. I would want equal chances of getting a promotion if there was a man standing next to me. Participant 9

Summary

The results of these interviews clearly show that the participants do not visualise a career in construction in positive ways. The participants observe that the construction industry is not only male-dominated, but irrelevant to their ambition to contribute to society. Participants themselves identify a lack of high-achieving, female role models or champions in the construction industry for these high school girls to emulate or aspire to.

Participants repeatedly expressed concern that they would not be heard or treated equally in the construction industry. These are students who are high achieving with aspirations in other fields including medicine and law. They do not express low confidence levels, rather have a lack of faith in the ability of the construction industry to deliver what they want, which is to be heard, respected and to see evidence of social impact.

Acknowledging that parental engagement and influence is a significant factor in choosing a career, one of the most interesting results is that the participants immediately flagged that a career in construction would not meet either their own or their parents’ aspirations for them in light of their hard work at a prestigious all-girls school.

Noting that all participants come from a single-sex independent girls’ school in Sydney, the participants report that construction is not discussed as a possible option for the girls,
although engineering and STEM opportunities are increasingly promoted. The participants did not identify STEM with the construction industry.

This sample of high-achieving girls from a single-sex independent girls’ school in Sydney had little or no interest in the construction industry. These results led into the second stage of the project - the quantitative analysis of nine years of Bachelor of Construction Management enrolments at the University of Technology Sydney. An analysis of enrolments data can shed some light on who is enrolling and where are they coming from.
A POSITIVE NOTE

Although much of the data gathered in this report indicates that the construction industry still struggles to be seen as a relevant and aspirational opportunity for women, there are some positive stories to draw some optimism from. Here is Mikayla’s case study:

**MY HIGH SCHOOL JOB AS A SKID STEER OPERATOR**

*Mikayla works part-time onsite as a Skid Steer Operator while she is still at school. Her parents are both working in the construction industry. She was interviewed for this project as an example of how high school girls can engage with the construction industry in positive ways. Here she gives her insight into how she got there, what her friends think and what her future plans are in the industry.*

**HOW DID YOU FIRST COME TO WORK ON SITE?**

My parents own a construction business. My dad was working on a site in Queensland with my brothers. I was 14 and I remember wanting to earn money.

*I wanted the same money my brothers’ got. And I hated working in the office!*

Mikayla is now in her final year of school and like many high-schoolers, was looking for a job to fit in around her school hours. She tried working in administration in the family business, but really didn’t like working in an office environment. Her family runs an earthmoving company, her brothers were already working there, and she saw the perfect opportunity to be better than them. Her brothers are no longer working in the business, one having moved to another job, and the other still at school.

**Dad taught me how to drive the Bobcat**

Mikayla decided to enter the family business and started the requisite training to become a machine operator. She is currently undertaking a Certificate III: Surface Extraction as a school-based trainee. She works on weekends driving a Positrak or Skid Steer Excavator.

*We learn about safety, environment and how to operate machinery. When I am on site I am driving the Positrak clearing away waste that large machines produce. I love it because I am outside, and doing work that I really enjoy*

**WHAT DO HER FRIENDS THINK?**

None of my friends do construction. My friends work at Noodle Box, Maccas and KFC.

Although Mikayla’s friends have more opportunities to do mid-week shifts after school (Mikayla needs a full day off such as a Saturday to do a day’s work on site), they don’t earn as much as Mikayla by the hour.

*When I was working on site on a Saturday I was getting paid more in one day than my friends were for their multiple shifts all week.***

**WHAT QUALITIES ARE VALUABLE WHEN YOU ARE WORKING ONSITE?**

Although the industry is changing, being a young girl on site is going to come with a few challenges but Mikayla sees them all as being manageable. Communications skills and being pretty easy going are the two most important skills that she identifies. And she clearly has both of these qualities.

*Being resilient and carefree really are the most important skills*

*As long as you are not up yourself you will be alright!*

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STAGE 2: RESULTS
UTS DATA: BACHELOR OF CONSTRUCTION PROJECT MANAGEMENT

Analysis of Main Round Offers, Enrolments and Graduations by Gender

The second stage of the research provides exploratory insight into the pathways of female students into the degree of Construction Project Management at the University of Technology Sydney (UTS). The report first analyses the gender balance of offers, enrolments and graduations of Construction Project Management (CPM) students at UTS. It then analyses the types of schools females who have applied to CPM are coming from and what proportion of applications are not school leavers, but rather come from alternative pathways such as mature age.

UTS provided nine years of data for the Bachelor of Construction Project Management (2010-2018 inclusive). The data included the Main Round Offers, whether the offers were given to current school leavers and if school leavers, what school they were matriculating from. This data indicates the level of interest in the CPM course by school and school leaver status. Enrolment data did not include school leaver status or identify the school.

Between 2010 and 2018 (inclusive) a total of 1264 offers were made. Of that total, 243 were offered to females. Of the 243 females, 112 were not current school leavers. This is in line with earlier data in the 2009 report (Williams, Sher, Simmons, Doesn & Pitt) that acknowledges university-level construction degrees have higher than average mature age enrolments.

Figure 1 following analyses the gender balance of main round offers, enrolments and graduations in the Bachelor of Construction Project Management offered at UTS between 2010 and 2018.
## Gender Analysis

**Bachelor of Construction Project Management, University of Technology Sydney**

Offers, Enrolments and Completions

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Round Offers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M/F Total</td>
<td>99</td>
<td>96</td>
<td>93</td>
<td>132</td>
<td>157</td>
<td>150</td>
<td>185</td>
<td>172</td>
<td>180</td>
</tr>
<tr>
<td>% Female</td>
<td>22%</td>
<td>26%</td>
<td>30%</td>
<td>19%</td>
<td>11%</td>
<td>14%</td>
<td>18%</td>
<td>25%</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Enrolments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M/F Total</td>
<td>93</td>
<td>78</td>
<td>79</td>
<td>106</td>
<td>163</td>
<td>148</td>
<td>164</td>
<td>161</td>
<td>152</td>
</tr>
<tr>
<td>% Female</td>
<td>20%</td>
<td>21%</td>
<td>23%</td>
<td>15%</td>
<td>12%</td>
<td>13%</td>
<td>17%</td>
<td>22%</td>
<td>16%</td>
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<tr>
<td><strong>Completions</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M/F Total</td>
<td>79</td>
<td>64</td>
<td>88</td>
<td>54</td>
<td>96</td>
<td>77</td>
<td>87</td>
<td>87</td>
<td>64*</td>
</tr>
<tr>
<td>% Female</td>
<td>11%</td>
<td>13%</td>
<td>11%</td>
<td>15%</td>
<td>21%</td>
<td>23%</td>
<td>11%</td>
<td>8%</td>
<td>16%</td>
</tr>
</tbody>
</table>

*only half year data available at time of publication*
Between 2010 and 2018 UTS offered placements in their Bachelor of Construction Project Management to 1264 students in total – 20% of whom were women. These offers converted to 1144 enrolments over the 9 years of which – 18% were female. Over those nine years, 15% of graduations have been women.

**Analysis of Main Round Offers by Current School Leaver Status**

The provided data was analysed by the school leaver status of female enrolment offers. This revealed that an average of 46% of all female enrolment offers each year were not current school leavers. This was slightly lower than the average of male, non-school leavers which was calculated to be 55% (see Figure 4).

**ANALYSIS OF SCHOOL LEAVER STATUS BY GENDER: FEMALE**

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<tr>
<td>SCHOOL LEAVERS</td>
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<td></td>
<td></td>
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<tr>
<td>13</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>10</td>
<td>11</td>
<td>17</td>
<td>21</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>OTHER PATHWAYS</td>
<td>9</td>
<td>10</td>
<td>14</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>17</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>% OTHER PATHWAYS</td>
<td>41%</td>
<td>40%</td>
<td>50%</td>
<td>48%</td>
<td>45%</td>
<td>40%</td>
<td>50%</td>
<td>60%</td>
<td>37%</td>
</tr>
</tbody>
</table>

**AN AVERAGE OF 46% OF FEMALE ENROLMENT OFFERS ANNUALLY ARE NOT CURRENT SCHOOL LEAVERS**

*Figure 2: Analysis of School Leaver Status: Females*

A comparison by year and gender (Figures 3 and 4) revealed that the proportion of school leavers to non-school leavers was much more stable in females. The male values had more variability across years, fluctuating from a low of 36% in 2018, to a high of 78% in 2014. Further research and more detailed data is needed to understand the reasons behind this variability in male metrics not being reflected in female metrics.
ANALYSIS OF SCHOOL LEAVER STATUS BY GENDER: MALE

<table>
<thead>
<tr>
<th>Year</th>
<th>Coeducation Male Main Round Offers</th>
<th>Catholic Male Main Round Offers</th>
<th>Government Male Main Round Offers</th>
<th>Total Male Main Round Offers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>77</td>
<td>36</td>
<td>25</td>
<td>138</td>
</tr>
<tr>
<td>2011</td>
<td>71</td>
<td>45</td>
<td>24</td>
<td>139</td>
</tr>
<tr>
<td>2012</td>
<td>65</td>
<td>35</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>2013</td>
<td>107</td>
<td>33</td>
<td>26</td>
<td>166</td>
</tr>
<tr>
<td>2014</td>
<td>139</td>
<td>30</td>
<td>26</td>
<td>195</td>
</tr>
<tr>
<td>2015</td>
<td>129</td>
<td>40</td>
<td>24</td>
<td>193</td>
</tr>
<tr>
<td>2016</td>
<td>151</td>
<td>58</td>
<td>21</td>
<td>229</td>
</tr>
<tr>
<td>2017</td>
<td>129</td>
<td>63</td>
<td>22</td>
<td>214</td>
</tr>
<tr>
<td>2018</td>
<td>153</td>
<td>97</td>
<td>24</td>
<td>274</td>
</tr>
</tbody>
</table>

AN AVERAGE OF 55% OF MALE ENROLMENT OFFERS ANNUALLY ARE NOT CURRENT SCHOOL LEAVERS

Analysis by School Type: Coeducation or Single Sex

UTS has collected data on the types of schools that students receiving their first-round offers are coming from. This provides a useful insight into which schools interest in the construction industry is coming from and is able to be analysed by type and by gender. The schools have been analysed according to whether they are independent, Catholic or government-funded, and whether they are coeducational or single-sex schools.

In NSW the majority of schools are coeducational, with single-sex options typically less common on the whole and concentrated in metropolitan areas. Data from the Good Schools Guide (see table following) shows the relative proportions of co-ed and single-sex female and male schools in NSW, QLD and VIC.

| Table 1: Proportions of schools by type. Co-ed and single sex. Source: Good Schools Guide |
|---------------------------------|----------|----------|----------|
| NSW        | QLD       | VIC       |
| Co-ed | 737 (84%) | 457 (90%) | 518 (87%) |
| Female | 75 (9%)   | 30 (6%)   | 53 (9%)   |
| Male    | 65 (7%)   | 22 (4%)   | 27 (4%)   |
| TOTAL secondary schools | 877 | 509 | 598 |
NSW data from the table above has been visualised as a pie graph in the figure following.

![Pie chart showing NSW schools by type](image)

**Figure 3: NSW Data on School Type: Coeducational and Single Sex**

The previous figure (Figure 3) illustrates the proportion of schools by type in NSW, it does not indicate the actual student numbers. It does however, clearly show a majority of NSW schools being co-ed.

![Bar charts showing school leaver status by gender](image)

**Figure 4: Analysis of School Leaver Status: Males**
The UTS school leavers data (2010-2018) suggests that there is more interest in a construction career and university pathway coming from single sex, independent schools. Figure 5 below shows that a significant proportion (55%) of main round offers are to female students from single sex schools. Although there is no recent data on the actual proportions of female students enrolled in single sex schools in NSW, 2010 research by Tully & Jacobs reports that 22% of female students were enrolled in single sex schools in 2010 – this number is expected to be significantly lower in the 10 years since that reporting. This indicates that a proportion of 55% of females coming from single sex schools in to the Bachelor of Construction Management program is a higher representation than in the general population of students in NSW.

Figure 5: Overall Analysis of School Type: UTS Bachelor of Construction Project Management Main Round Offers 2010-2018

Independent, Catholic or Government

The main round offer data was analysed by school funder type (independent, catholic and government) and gender (single sex or co-ed) and compared to the overall ABS data on school type. This data is illustrated in Figure 6 following. The ABS data shows that a majority of enrolled students come from government schools, however, this is not reflected in the Construction Project Management data. Female students interested in Construction Project Management are more likely to be from an independent school – at a rate twice the proportion of independent schools in Australia (ABS 2017 data) – and are half as likely to be coming from a government school.

The following figure analyses the UTS data in the context of Australian data on school type from the Australian Bureau of Statistics.
Figure 6: Australian Versus UTS: Data on Enrolments in Government/Independent/Catholic Schools
Index of Community Socio-Educational Advantage (ICSEA)

The Index of Community Socio-Educational Advantage (ICSEA)\(^{10}\) is a scale that represents levels of educational advantage. A value on the scale assigned to a school is the averaged level for all students in the particular school.

Every school in Australia has an ICSEA value on a scale which has a mean of 1000 and a standard deviation of 100. ICSEA values range from around 500 (representing extremely disadvantaged backgrounds) to about 1300 (representing schools with students from very advantaged backgrounds).

Data used to calculate the ICSEA score includes:

- Parent occupation.
- Senior management in large business organisation, government administration and defence and qualified professionals.
- Other business managers, arts/media/sportspersons and associate professionals.
- Tradesmen/women, clerks and skilled office, sales and service staff.
- Machine operators, hospitality staff, assistants, labourers and related workers.
- Not in paid work in last 12 months.

School education level

- Year 12 or equivalent
- Year 11 or equivalent
- Year 10 or equivalent
- Year 9 or equivalent or below 10

Non-school education level

- Bachelor degree or above
- Advanced diploma/diploma
- Certificate I to IV (including trade certificate)
- No non-school qualification

\(^{10}\) Guide to Understanding ICSEA: Australian Curriculum Assessment and Reporting Authority
School Leavers, Construction Project Management and ICSEA

UTS data on main round offers was analysed by ICSEA score for each school. The research found that the average ICSEA score of schools where main round offers have been made from 2010-2018 sits at 1090 which is close to the national average of 1000.

The distribution of ICSEA scores was examined for the nine years of enrolment data available, and these scores of relative advantage were found to be very close across genders – with scores for male student offers at 1092 and female at 1088.

*Guide to Understanding ICSEA: Australian Curriculum Assessment and Reporting Authority
The relatively low sample size of 568 and the fact that this data is drawn from only one tertiary education type (university) and a single university (UTS), means that the conclusions drawn from this data are limited. This research does not make a comment about the culture or the quality of single sex or coeducational education, nor does it seek to enter into education policy debates – but the results do highlight that young women expressing interest in construction management appear to be more likely to enrol from single-sex high schools in NSW. This suggests the need for a larger investigation in the context of what schools are drawing construction industry interest and why.

**Figure 8: Distribution of ICSEA Scores of Schools Receiving Main Round Offers – Gender Comparison**

**DATA LIMITATIONS**
CONCLUSION

The career aspirations of high school students are complex and multi-dimensional. The interviews with high school students in this study highlight a number of issues that are impacting on girls choosing a construction career. These issues include a lack of awareness of the potential of the industry, of earning potential and the diversity of career pathways within the sector. In addition to this, the construction industry has the reputation of being an unchanging, male-dominated industry where women won’t be listened to or heard – this is an image that needs to be shifted in order for young women and their parents to consider the other benefits of working in the industry.

Participants in the study were unaware of the scope of the construction industry and had no concept of achievement outcomes in the industry. Other issues raised in the interviews compounded the aversion of students to a career in construction, they don’t see it as aspirational, they don’t see women achieving in the industry, and they are unable to visualise themselves as succeeding in the industry doing something they enjoy. Interestingly, participants do not link the construction industry with STEM. So, the industry cannot rely on picking up recruitment by tailgating from the wave of STEM interest and investment in high schools.

If the industry expects female high school students to aspire to a construction career, it needs to rebrand itself not only to the students, but also to parents and schools, in order to overcome the barriers of lack of interest by students, influence of parents and lack of guidance towards the industry from school networks.

The research found that there is gender equivalence in the ICSEA scores (Australian school rating of relative socio-educational advantage of a school) across the schools where interest in the Construction Project Management Course is coming from. This indicates that girls and boys from the same range of backgrounds are applying for the course at UTS.

The analysis of data on the genders of main round offers, enrolments and graduations in their Bachelor of Construction Management course are in line with other research findings both Australian and overseas, that women are under-represented in Architecture, Building and Construction degrees – this is despite women being over-represented in university enrolments as a whole. In addition
to this, of the women receiving first round offers to enrol, nearly half (46%) are not current school leavers. This has significant implications on how best to recruit women into construction courses.

Girls coming straight from single sex independent schools are overrepresented in the UTS data on main round offers. This warrants further research and can inform recruitment practices by identifying where recruitment can be intensified or built upon.


McDonald, J., Loch, B. & Cater-Steel, A. (2010). Go WEST – Supporting women in engineering, science and technology: An Australian higher education case study


APPENDIX 1: APPROACH AND METHODOLOGY

The research undertakes a mixed method approach to developing a deeper understanding of pathways into a construction career for girls in order to develop more targeted recruitment approaches.

Firstly, a qualitative approach is undertaken to understand high school girls’ perceptions of the construction industry. Year 11 girls studying in Year 11 at a Sydney all-girls high school were recruited for 1-hour interviews to explore what influences their decision on a career path and their perceptions and biases of the construction industry as a potential career option. The results of these semi-structured interviews are analysed and presented in this report thematically.

The second stage of the research provides exploratory insight into the pathways of female students into tertiary Construction Management courses – including the types of school females are more likely to come directly from as school leavers, and what proportion are not school leavers, but rather come from alternative pathways such as mature age.

Stage One Interviews

Recruitment

Ten Year 11 girls from an all-girls independent high-school in Sydney were recruited to be interviewed in August 2018. The Year 11-year group attended a presentation given by the author about career paths and male-dominant industries. At the end of the presentation, the students were invited to participate in interviews to explore their career perceptions. They were not told that the project was specifically interested in the construction industry at the time of recruitment. This ensured that self-selection of participants was not limited to those who were already interested in construction. The intention of the research was always to explore some of the reasons why girls do not have construction on their radar and the researcher did not want to bias the recruitment by revealing the focus on the construction industry.

Semi-Structured Interviews

The interviews were semi-structured. Participants were asked about their career aspirations, how they have been influenced, and their perceptions of the construction industry. They were asked to map their career aspirations on a timeline dating back to preschool to have a look at how these had shifted over time and what had influenced them. The semi-structured question framework is included as Appendix 1.

Human Ethics Clearance

The research that informs this document was collected from a range of sources. All research involving human participants took place in accordance with international standards for ethical human research. The University of Technology Human Research Ethics approval number for the project is ETH 18-2656.

Stage Two – Analysis of Construction Management Enrolment Data

The University of Technology provided data on main round offers, enrolments and completions (graduations) for their Bachelor of Construction Management Degree for 9 years (2010-2018 inclusive). Data was able to be analysed by gender, school and whether the enrolment was a Current School Leaver (CSL) or not.
APPENDIX 2: SEMI-STRUCTURED INTERVIEW FRAMEWORK

Semi-Structured Interview Questions

Exercise 1: Mapping career aspirations throughout school

Participants will spend some time with the researcher mapping out how their career aspirations have changed over time since primary and where they are now. What are they planning on doing after school finishes? Activity involves drawing/sketching around timelines shown below.

**CAREER ASPIRATIONS**

![Timeline Diagram]

<table>
<thead>
<tr>
<th>Semi-structured questions:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the qualities of a good job?</td>
<td>e.g. Salary; flexibility; fun; stability; creativity, community impact, helping people</td>
</tr>
<tr>
<td>What do you want to do after school?</td>
<td>Gap year, unit other.</td>
</tr>
<tr>
<td><strong>Show Focus Group ABS statistics on gendered work roles</strong></td>
<td>Generate discussion on the implications of gendered roles</td>
</tr>
<tr>
<td></td>
<td>How aware are girls of gendered roles and the pay gaps?</td>
</tr>
<tr>
<td></td>
<td>Do they care?</td>
</tr>
<tr>
<td></td>
<td>What do girls value about specific career choices at an early age: glamour, salary, flexibility</td>
</tr>
<tr>
<td>How have you been guided or helped to make choices about subjects and careers?</td>
<td>What career directions are you thinking about?</td>
</tr>
<tr>
<td></td>
<td>Are subjects a decider for career directions while at school?</td>
</tr>
<tr>
<td>Parents influence</td>
<td>Do you talk about this with your parents? Are parental perceptions influencing girls’ decisions around career path and construction jobs?</td>
</tr>
<tr>
<td>Section</td>
<td>Questions</td>
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<tr>
<td>----------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Teachers influence</td>
<td>What kind of support does the school give you in career guidance? Have you talked about career with your teachers yet?</td>
</tr>
<tr>
<td></td>
<td>What do your teachers say to you about your career thoughts/directions?</td>
</tr>
<tr>
<td></td>
<td>Have you been told you SHOULD or SHOULD NOT do anything? Discuss</td>
</tr>
<tr>
<td>Establish perceptions of the construction industry</td>
<td>What do you think are the types of jobs available in the construction industry? And what do you think are the skills required?</td>
</tr>
<tr>
<td></td>
<td>What subject choices do you think are necessary for a construction career?</td>
</tr>
<tr>
<td></td>
<td>Are there any jobs you can see yourself in? Why? Why not?</td>
</tr>
<tr>
<td></td>
<td>Who would be reluctant to consider a job in the construction industry? Discuss? (why –gender gap, interest, relevance, etc.)</td>
</tr>
<tr>
<td>Trades</td>
<td>Have they considered a trade – why not? What might be the benefits of a career in trades? I discuss flexibility, knowledge about built environment, pay, etc.)</td>
</tr>
<tr>
<td></td>
<td>What might be negatives? Discuss</td>
</tr>
</tbody>
</table>