# Glitter, Glamour, and the Future of (More) Girls in STEM

## Gendered Formations of STEM Aspirations

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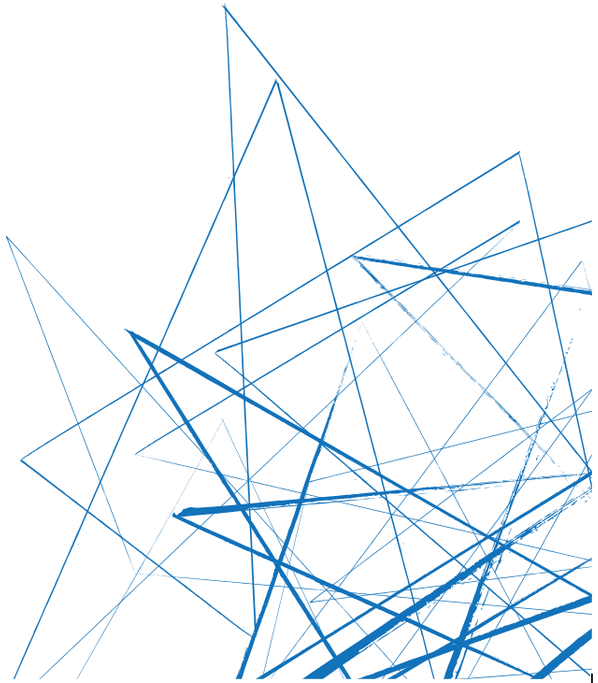

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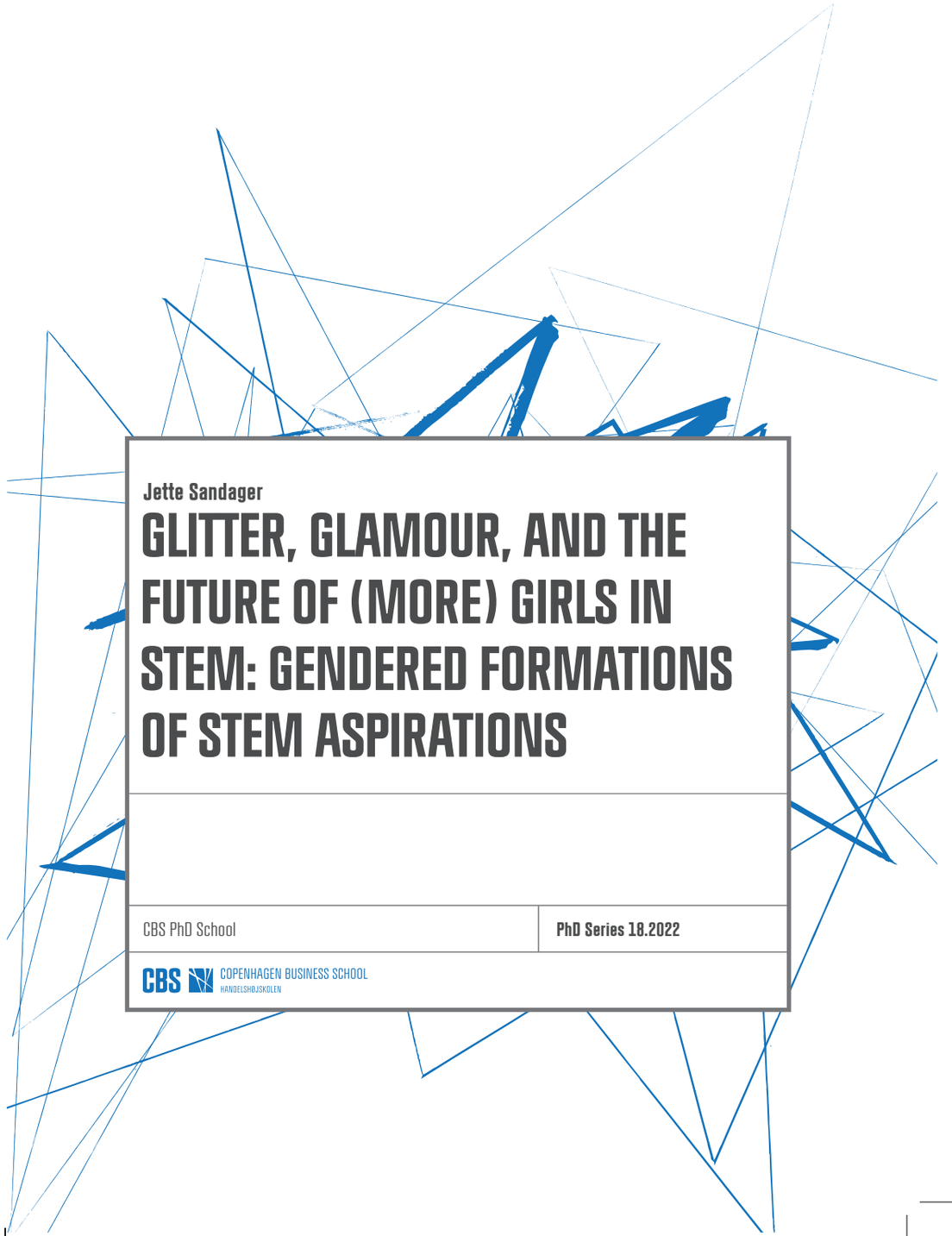

Jette Sandager

# GLITTER, GLAMOUR, AND THE FUTURE OF (MORE) GIRLS IN STEM: GENDERED FORMATIONS OF STEM ASPIRATIONS

CBS PhD School | **PhD Series 18.2022**

CBS COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

# Glitter, Glamour, and the Future of (More) Girls in STEM:

## Gendered Formations of STEM Aspirations

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## ENGLISH ABSTRACT

The field of policy has long sought to solve the global problem of girls' lacking STEM aspirations, deploying a range of gendered educational STEM policies to this end. This thesis studies the attempts to solve this problem and thus how such policies organise and govern girls' STEM aspirations.

Inspired by the current literature on aspiration formation, more specifically on aspiration-raising policy, and affective governmentality, the thesis focuses on how gendered educational STEM policies seek to produce different times and affects as a means of organising and governing girls' STEM aspirations. However, because such policies sprinkle glitter on STEM to produce these particular times and affects, the thesis is centred on the role that glitter plays in organising and governing the STEM aspirations of girls.

To analyse the organising and governing role played by glitter, in this thesis I develop a new material/discursive concept of glitter inspired by Coleman's original concept of it. However, I analyse the sensory affective aspects of glitter in addition to the 'internal affect' on which Coleman focuses. I contend that in attracting and reflecting light, glitter allures sight and attention, thus appearing to be an efficient instrument for alluringly attracting girls to STEM. However, glitter only allures sight and attention to certain fields, leaving others in darkness. As such, glitter is not a reliable tool for organising and governing social and thus aspirational behaviour, as all manner of disturbing matters could lurk in the darkness of glitter.

In the thesis, I use the new concept of glitter to scrutinise this dark side of glittery STEM. This scrutiny reveals that gendered educational STEM policies: (1) produce positive future time, but also negative past time, which troubles that future time; (2) condition stereotypical subjectivity, which might allow a new type

of girl to aspire to STEM, but similarly dissuades non-stereotypical girls from doing so; and (3) might not organise or govern the STEM aspirations of girls.

On the basis of the thesis' findings, I conclude that gendered educational STEM policies are over-efficient in the sense that they organise and govern what they intend to but indeed also what they do not. The policies produce positive future time and inclusion as intended, but also negative past time and exclusion, which is not intended. Moreover, the thesis brings me to the conclusion that in sprinkling 'blinding' glitter, the field of policy might blind us all to its unintended effects, thus also rendering us unable to act on the fact that gendered educational STEM policies – paradoxically – organise and govern effects that potentially counteract those intended.

## DANISH ABSTRACT

Pigers manglende STEM aspirationer er et problem som et væld af offentlige såvel som private aktører, har forsøgt at løse længe. Over de sidste mange år er en lang række af kønnede STEM initiativer – *policies* – blevet planlagt og implementeret for at løse problemet. Denne afhandling undersøger de mange policies' forsøg på at styre på pigers STEM aspirationer, samt de styringseffekter og implikationer, de forskellige policies har.

Med udgangspunkt i teorier om aspirationsdannelse, og særligt teorier om aspirationsfremmende policy, samt teorier om affektiv governmentalitet, har afhandlingen fokus på, hvordan de mange policies forsøger at styre på pigers STEM aspirationer gennem produktion af bestemte tider og affekter. Da de mange policies kaster store mængder af skinnende glitter på STEM i deres forsøg på at producerer bestemte styrende tider og affekter, har afhandlingen et særligt fokus på den rolle som glitter spiller i styringen af pigers STEM aspirationer.

For at analysere glitters styrende rolle udvikler afhandlingen et nyt begreb om glitter. Begrebet er inspireret af Colemans originale glitter begreb, men fokuserer på de sensoriske affektive aspekter af glitter i tillæg til Colemans fokus på 'indre' affekt. Afhandlingen argumenterer for, at glitter ved at tiltrække og reflektere lys oplyser visse felter og dermed drager syn, opmærksomhed og interesse til disse felter. Derfor kan glitter også fremstå som et effektivt instrument i styringen af pigers interesse mod STEM. Men idet glitter kun oplyser visse felter, og dermed efterlader andre felter i dunkel skygge, så er glitter ikke et ufarligt styringsværktøj; alverdens forstyrrende elementer kan ubemærket skjule sig i mørket af glitter.

Ved brug af det nye glitter begreb undersøger afhandlingen de dunkle skyggesider af det glitrede STEM felt som de mange policies konstituerer. Gennem dens undersøgelser, afslører afhandlingen, at de mange policies (1) producerer positive

fremtider, men også negative fortider, der forstyrrer fremtiderne, (2) sætter stereotype betingelser for kønnet subjektivitet i STEM, hvilket åbner for, at nye typer af piger kan aspirere til STEM, men også udelukker, at ikke-stereotype piger kan aspirere til STEM, og (3) muligvis slet ikke styrer på pigers STEM aspirationer.

På baggrund af sine findings, konkluderer afhandlingen, at de mange policies ikke kun styrer på det, de har til intention at styre på, men også det, de ikke har til intention at styre på. De mange policies producerer positive fremtider, men også negative fortider, og de inkluderer nogle piger i STEM, samtidig med, at de ekskluderer andre piger fra STEM. Ydermere, konkluderer afhandlingen, at grundet de mange policies' brug af 'blændende' glitter, så overser vi muligvis de mange policies' overstyring. Derfor vil vi heller ikke kunne handle på det paradoksale faktum, at de mange policies styrer på ikke-intenderede effekter, der potentielt modvirker de intenderede effekter.

# CHAPTER 1
# INTRODUCTION

## *Broken glass. It's just like glitter, isn't it?*

(Pete Doherty, ENM, November 2005)

**1.1 Girls in STEM: A 'Glamourous' World of Broken Glass |** Punk-rocker Pete Doherty is probably best known for his heroin addiction and stormy relationship with supermodel Kate Moss, so how could his observation about glitter possibly have inspired a PhD thesis studying the formation of girls' science, technology, engineering, and mathematics (STEM) aspirations? Because current gendered educational STEM policy puts great efforts into 'glittering-up' STEM to make it attractive for girls. Indeed, as I will continually show throughout this thesis, glitter permeates policy-initiated activities; it shines from glossy policy papers and sparkles in radiant policy campaigns, all to foster STEM aspirations in girls and ensure a dazzling future with more girls in STEM. As Doherty reminds us, however, broken glass glitters too, and the performativity of glitter is not always positive. In fact, some critical questions may be in order. For example, what actually happens to STEM when it is sprinkled with glitter? What new futures does glittery STEM organise – what pasts and presents? One could also ask what affects glittery STEM produces, and whether it generates positive or negative attraction? Moreover, what dangers might lurk in glittery STEM if those teeny bits of glitter are sharp? Can we 'cut' ourselves on glittery STEM, be harmed? Expanding on the metaphor of broken glass, one could also question whose gaze the magnetic glitz of glittery STEM captures and what this captivation causes one to overlook? Finally, and more generally, how does glitter organise STEM? Which affects and times does glittery STEM produce? And what potential dangers does it hold?

Inspired by all the questions that flow from Pete Doherty's quote, I aim in this thesis to explore what role glitter plays in the organising and governing of girls' STEM aspirations, and to see how gendered educational STEM policy thus comes to organise and govern girls' STEM aspirations by sprinkling glitter. To this end, I scrutinise the organising and governing effects of gendered educational STEM policy, examining whether these effects are solely aligned with the effects intended by policy or whether policy with its glitter sprinkling becomes over-efficient, producing numerous unintended effects along with those intended. Before focusing on glitter, I will first introduce the gender-segregated labour market, including the gender-segregated field of STEM.

**1.2 STEM: A Gender-segregated Labour Market |** That we live in a world where men and women occupy very different jobs, work functions, and work positions is hardly news (e.g., Hegewisch & Hartman, 2014; ILO, 2019). Patterns and trends vary across countries and regions, but as a rule women are more likely to work in the public sector, often in (primary) education, care, or healthcare (Sørensen, 2019). They are also more likely to work in manual and production jobs (OECD, 2002) and less likely to have leadership and executive positions (e.g., Muhr, 2011). In recent years STEM has become an area of the gender-segregated labour market to receive great attention, not because gender segregation in STEM is any worse than other professional fields, but because a shortage of STEM labour looms ever larger on the horizon, even as the numbers of people – especially girls and women – aspiring to enter STEM has stagnated (e.g., OECD, 2017). I will leave the issue of girls' and women's low STEM aspirations for the next section and for now turn to defining STEM – an acronym so recently introduced to our educational lexicon and yet so pervasive as to seem to have always existed.

When I had my Danish primary schooling in the late 1990s, STEM subjects were still individually referred to as science, technology, and mathematics, each of which had engineering elements, although not specifically called such. Even years later in high school, STEM remained a set of separate subjects taught by different teachers, all of whom approached their subjects from different angles and with varying themes and didactics.

Today, the four STEM subjects tend to be seen as naturally belonging together, and everyone in both public and educational discourse seems to communicate about STEM as a commonly understood and time-honoured phenomenon. According to Loewus (2015), however, there is nothing natural about the STEM acronym, which is a well-thought-out construct first introduced by Judith A. Ramaley during her tenure as assistant director for human resources at the American National Science Foundation from 2001 to 2004. Ramaley and her team were tasked with developing a curriculum that would enhance future education in science, technology, engineering, and mathematics. The team initially proposed the acronym 'SMET' for the four subjects, but Ramaley changed it to 'STEM', feeling it had a better ring to it (Christenson, 2011). The acronym stuck and has since been uttered by public figures as disparate as former US President Barack Obama (The White House, 2013) and *Desperate Housewives* actress Eva Longoria (Canfield & Long, 2019), just as it has found its way into policy all over the world.

In an interview with Jerome Christenson (2011), Ramaley was asked why these four particular subjects were to be promoted. She responded that her team thought of science and math as bookending technology and engineering, because one needs science and math to acquire a basic understanding of the universe, and engineering and technology provide the means for people to interact with it. As such, STEM incorporates elements of human action and understandings of the

world into every aspect of education (Christenson, 2011). More recently, an 'A' has been added to the acronym, so people have begun saying 'STEAM' instead of 'STEM'. The 'A', which stands for arts, indicates that one needs not only STEM competencies but also the humanities to understand and interact with the universe. Thus, an interdisciplinarity also focused on critical and creative thinking is argued to be necessary for educating children whose dedicated STEAM competencies can positively contribute to the future (Marr, 2020). Although the STEAM acronym is now a recognised part of our educational lexicon, in my experience most people still prefer STEM, as the implication of the 'A' in STEAM, being too abstract, requires explanation.

Since being coined, STEM has come to mean many things, and although not an 'empty signifier' hollowed of meaning, the acronym undeniably has a variety of connotations. A simple Google search reveals that STEM is currently characterised as something that leads to a good and secure job (Adams, 2014), that provides a high and steady income (Masterson, 2021), that ensures prestige and societal recognition (Jakob, 2019), that allows one to have an important impact on the world (STEM Learning, 2020), and that opens doors for project work as well as research funding (see, e.g., The Velux Foundation, n/d). None of the current meanings ascribed to STEM are negative; on the contrary, STEM seems to hold a direct promise of a good life, of a future imbued with security, money, and status.

Indeed, most people seem to happily engage with STEM, seeking a dusting of the positive shine it attracts and spreads. At the moment, for instance, glittery STEM helps brighten Danish vocational training, long perceived as an 'unsexy' underling of higher education (KL, 2015). Danish foundations like Novo Nordisk Foundation (n/d) and the Danish STEM initiative the Technology Pact (n/d) are currently pouring money into projects aimed to help integrate STEM in vocational training and thus – supposedly – enhance its worth. As such, STEM serves not

only to shine up vocational training, but indeed also to turn it into an education that better qualifies its graduates to help give all society a brighter future.

Thus, STEM has no fixed meaning. Certainly, it relates to a set of educational skills, but it also embodies a range of other meanings, primarily tied to visions of a bright, new future. In this thesis, I investigate STEM in the specific sense of a future labour shortage and therefore of women as a valued resource in high demand, which is a meaning ascribed by policy. As such, I am interested in understanding what happens to gender in the glittery construction of STEM? What gendered futures does this construction organise? And how do these futures condition gendered subjectivity in STEM?

As this section has shown, the gender discourse traceable in gendered educational STEM policy conservatively frames gender as binary and thereby as a biological matter of girls/boys and women/men. This discourse can be – and indeed has been – criticised for presenting too simplistic an understanding of what gender is. Butler (1999 [1990]), for instance, has argued that gender is not constituted on a biological basis, but rather performatively on the basis of the practices and social behaviour a body adopts and performs (Butler, 1999 [1990]). I subscribe to the critical argument of Butler (1999 [1990]) while also seeing gender as something variously and differently shaped depending on such factors as the shifting discourses, affects, and times a gendered body has to navigate.

However, for the sake of studying and analysing gendered educational STEM policy and its effects, for this thesis I have chosen to accept policy's binary terminology and operate with the terms 'girls/women' and 'boys/men'.[1] As such, subjects with female-gendered body signs are defined as girls or women, and those with the opposite, male-gendered body signs as boys and men. This choice holds

[1] As all the people with female-gendered body signs that I have worked with in this thesis referred to themselves as 'girls' or 'women', I have also found it fair to refer to them as such.

the problematic potential of reproducing the exact same exclusionary gendered ideas and stereotypes that cause gender segregation (Archer et al., 2013). On the other hand, however, deconstructing the binary gender framing of policy makes it difficult to focus my study on specific subjects and objects, as well as carries a risk of further promoting men rather than women in STEM (see Spivak, 1988). For one thing, such deconstruction would mean that educational STEM policy ceased to affirmatively target bodies with female-gendered body signs, seeking out all bodies instead. This might not be so terrible, but since bodies with female-gendered body signs are those experiencing exclusion from STEM, targeting all bodies could mean women's continued exclusion from the field. Accordingly, my choice of accepting the terminology of policy has certain ramifications, but then so would a decision to reject it.

Next, I describe a particular part of the gender-segregated labour market – STEM. From here on out, I will therefore focus exclusively on the gender segregation in STEM. I nonetheless hope that the thesis' findings can help give insight into the more general issue of the gender-segregated labour market and the problems policy faces in trying to address the issue. Thus, I return to this issue of the gender-segregated labour market in the Conclusion where I conclude on how the findings of the thesis might assist policy in discovering new solutions for this.

**1.3 Girls and Women in STEM – A Global Policy Issue |** By every measure, a shortage of STEM graduates appears to loom in the future. US forecasts predict that, by 2025, the nation will lack nearly 3.5 million STEM graduates (Lazio & Ford, 2019). Similarly, the European Union (EU) is forecast to have about 7 million STEM job openings by 2025, even as great numbers of European STEM workers approach retirement age and few EU member states are seeing any rise in young people with STEM aspirations (Caprile et al., 2015). In Denmark, which serves as the primary empirical backdrop of this thesis – the

country is predicted to lack approximately 13,500 STEM graduates by 2025, a figure likely to increase by another 50% towards 2030 (IDA, 2018; DEA, 2019).

The global shortage of STEM graduates has made gender segregation in STEM a major policy issue (e.g., OECD, 2017; UNESCO, 2017a; see also DeWitt et al., 2016; Archer et al., 2015). Comparing eight different nations (Canada, France, Germany, Italy, Spain, Sweden, the UK, and the USA), Dard and Payne (2021) show that, although receiving bachelor's degrees at a greater rate than men, women in every nation but Italy make up far less than half of the STEM graduates. Denmark is no exception to this global trend: most bachelor graduates in Denmark are similarly women, yet only 20.7% of them are STEM graduates (Faber et al., 2020). Against this backdrop, getting women into STEM is an obvious solution to closing the STEM gap, for which reason a range of international, national, and local policies have been planned and implemented, not only to foster girls' aspirations to work in STEM but also to pave the way for a STEM-related path of education.

Starting in an international setting, both the Organization for Economic Co-operation and Development (OECD) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO) have actively promoted gendered educational STEM policy that can form girls' STEM aspirations and ensure that more girls come to engage in STEM work. For instance, the OECD (2017) has published a series of reports identifying a need to motivate more girls to use their STEM competencies, and mapped a range of best practices that its member nations should integrate to ensure more girls enter STEM in the future. Similarly, UNESCO has initiated a group of gendered educational STEM policy initiatives, the TeachHer initiative of which has generally received the most attention. This public-private partnership attempts to mobilise public and private actors to encourage girls to pursue a future STEM education, primarily in Africa

and Central America. As such, the initiative focuses on creating an entire corps of gender-responsive educators, administrators, and policy actors able to deliver STEM education that helps form STEM aspirations through a positive appeal to girls (UNESCO, 2017a).

Supplementing, the international work of the OECD and UNESCO, in 2012 the EU launched the policy campaign Science: It's a Girl Thing (EU, 2012). The multi-pronged campaign included both a website where girls could learn about future STEM careers and a video showcasing women as a natural part of STEM. The campaign was therefore also intended to enable girls to see themselves as a part of STEM and thus to foster STEM aspirations that could ensure the girls took STEM positions in the future.

In the narrower national setting of Danish policy, a large group of national gendered educational STEM policies have been planned and implemented to support the goals of the international policies. One such policy is The National Science Strategy (2018), which enumerates a series of national goals for Danish children's – and indeed Danish girls' – STEM achievements while also offering various pedagogical tools to be integrated into Danish STEM education with a view to encouraging further STEM aspirations among students. Another Danish policy is enacted by the Technology Pact (2020a), which has a gender-inclusive focus on all children but includes a special policy track dedicated to financing organisations looking to collaborate on projects that can inspire more girls to enter future STEM education. For instance, the Technology Pact has recently funded High5Girls, a project aimed to inspire more girls in the 13–19 age group to explore STEM education through technology camps and hackathons (Technology Pact, 2021).

To further undergird national policy, local governments have designed a range of local gendered educational STEM policies. I present one such policy in Article 1, but a variety of others exist, such as Taarnby municipality's Strategy for Mathematics and Natural Science 2020–2024, which states that teachers and educators particularly need training to accommodate girls' low STEM aspirations (Taarnby Municipality, 2020), or the STEAM Agenda of Esbjerg Municipality, which emphasises play and experiments as important tools for motivating girls to enter future STEM education (Esbjerg Municipality, 2021).

According to Shore and Wright (2011), policy is enacted by not only formal policy actors like those above but also a range of commercial and market-based actors. Shore and Wright (2011) state: 'policies are major instruments through which governments, companies, non-governmental organisations (NGO's), public agencies and international bodies classify and regulate the spaces and subjects they seek to govern' (p. 2). As such, Shore and Wright (2011) argue that policy is embedded throughout social and cultural 'policy worlds' (p. 1) as well as plays out in various ways at both public and private sites.

Subscribing to the theories of Shore and Wright (2011), I end this section by briefly introducing some of the commercial and market-based policy that has been initiated along with formal policy in recent years. Take Microsoft's #MakeWhatsNext campaign, which consists of a series of videos showcasing how women's low representation in STEM is solely due to the failure to include women and not to any lack of STEM competency (Microsoft, 2016a, 2016b). Deploying a range of emotional visuals, the videos attempt to get girls to aspire to STEM education, as well as to illustrate how past discrimination, not incompetence, primarily accounts for women's modest engagement in STEM. Another policy is Google's initiative to transform 3,900 square feet at its New York City headquarters into a technology lab where girls can explore their STEM

aspirations by actively testing and utilising creative STEM tools (Fustich, 2018). As such, the initiative is meant to encourage girls to pursue a future STEM education by giving them an opportunity to have fun exploring exciting technology.

Beyond the corporate technology sector, represented by Microsoft and Google, lies the toymaker Mattel's policy, enacted through the production of various STEM Barbies (e.g., STEM Kit Barbie, Robotics Engineer Barbie, Astrophysicist Barbie, Marine Biologist Barbie, and Vaccine Developer Barbie). These Barbies are intended to allow girls to develop STEM aspirations through imagination and amusing play with Barbies (Amazon, n/d). Similarly, Danish foundation LIFE has a policy of making heavy financial investments in developing educational courses and big mobile labs to nurture girls' STEM aspirations by offering them STEM education in professionally equipped labs (LIFE, n/d, a).

The gendered educational STEM policies presented above are but a few of the policies one can encounter. This therefore positions such policies in a complex and intricate field requiring nuanced analysis and a willingness to play with and merge different theories – that is, if all the field's organising and governing attempts and effects are to be embraced. Consequently, this thesis seeks first to build novel theory and then to use it for the express purpose of analysing: how gendered educational STEM policy attempts to govern the STEM aspirations of girls? What role glitter plays in the attempts to govern girls' STEM aspirations? And what problems and implications are produced through policy's use of glitter to try and govern girls' STEM aspirations? I pursue these analyses with a specific focus on affect and time, because – as I have shown above and will demonstrate throughout the thesis – gendered educational STEM policy produces and intends to produce explicit affects and times as it endeavours to organise and govern girls' STEM aspirations. Policy sprinkles glitter, both with an ambition to evoke positive,

alluring attraction and with a clear desire to leave inadequate past and present times behind and move girls into a brighter STEM future.

**1.4 Research Question(s): Wonders and Curiosities |** Focusing on the organising and governing effects of gendered educational STEM policy, the thesis asks the following overall two-part research question:

How does gendered educational STEM policy organise and govern girls' STEM aspirations? And what implications might this have?

To answer this overall research question and ensure a focus on affect and time, the thesis further explores these three guiding questions:

1) How does gendered educational STEM policy attempt to organise and govern girls' STEM aspirations through productions of affect and time?
2) Which futures does gendered educational STEM policy organise, and how do these condition gendered subjectivity?
3) In what ways do girls affectively and temporally relate to STEM?

The three articles constituting the thesis' analysis answer the first half of the overall research question, with each article specifically focusing on one of the three guiding questions. As such, the first article seeks to answer question 1, the second to answer question 2, and the third question 3. The second half of the overall research question is covered in the second part of the Discussion, at which point I return to the opening quote by Pete Doherty (2005) and use the insights and findings produced throughout the thesis to discuss the implications – or dangers – of sprinkling glitter.

**1.5 Structure of the Thesis |** I start Chapter 2 by introducing the different bodies of literature that this thesis is inspired by and seeks to contribute to. In this chapter I also initiate the theoretical development of a novel affective governmentality and a new material/discursive concept of glitter.

In Chapter 3, I briefly use my new material/discursive glitter concept to illustrate how gendered educational STEM policy sprinkles material and discursive glitter all over STEM in an attempt to make it more attractive to girls. As such, this chapter contextualises the analysis and discussion sections.

In Chapter 4, I explain the ethico-onto-epistem-ological position of the thesis and the combination of theories this position encourages. Further, I explain my theoretical journey, the thesis' glittery facet methodology, and the different methods I have merged inspired by this methodology. Lastly, I comment on the challenges COVID-19 has posed to my project, my own positionality, and the project's non-comparative character.

In Chapter 5, I describe the ethical considerations that have played a major role in the thesis. First, I present the ethical considerations related to working with young people considered minors in Denmark. Second, I comment on my ethical considerations related to working in a world of good intentions often gone 'bad'. Lastly, for the sake of transparency, I describe the process of co-authoring with senior academics.

In Chapter 6, I present the three articles comprising the thesis' analysis and introduce the analysis intended to help answer the first part of the overall research question. Article 1 will aid in answering guiding question 1, Article 2 question 2, and Article 3 question 3.

In Chapter 7, I discuss the analytical findings. In the first part of the chapter, I consider how my findings serve to answer the first half of the overall research question. In the second part, I examine how the analytical findings relate to the dangers of glitter to which Pete Doherty (2005) alluded, thus answering the second half of the overall research question in discussing the implications of the findings. In the third and last part, I discuss how the findings of the thesis contribute to current research and point to relevant future research.

In Chapter 8, I present my conclusions on the findings and the contributions of the thesis, while also elaborating on the new theoretical as well as empirical insights the thesis has provided. Moreover, I return to the Introduction and conclude on how some of the thesis' findings can be brought to the field of practice and assist policy in discovering new solutions for the gender-segregated labour market in general.

# Chapter 2
# Theoretical Framework

In this chapter, I present the three bodies of literature inspiring this thesis and to which it seeks to contribute: literature on aspiration formation, affective governmentality, and glitter. I also start theoretically developing a novel concept of affective governmentality, and a new concept of glitter, merging Coleman's theories on glitter with the concept of affective governmentality. Against this backdrop, I thus turn her theories into a broader material/discursive concept of glitter useful for more generally analysing organising and governing practices within organisation and management studies (OMS). As such, this chapter not only reviews these three bodies of literature but also lays the groundwork for the further theoretical development of affective governmentality and glitter.

**2.1 Temporal Formations of Aspirations |** To analyse how aspirations are organised and governed, it makes sense to look to the current literature on aspiration formation. In the following, I therefore present the current literature on aspiration formation, my ultimate goal being to contribute to this literature by analysing the temporal organising and governing of girls' STEM aspirations in novel ways. I begin with literature that presents theoretical ideas about aspiration formation in a more general educational setting, then proceed to theoretical ideas specifically connected to the formation of aspiration-raising policy, which is a certain interest of this thesis because it understands gendered educational STEM policy exactly as such policy intending to raise STEM aspirations in girls.

The general literature on aspiration formation can largely be divided into three corpora, each with respective concerns regarding the organising and governing effects of different versions of past, present, and future times in the formation of aspirations. The first group of literature is mainly inspired by Bourdieu's theories about socialisation. According to Bourdieu (1984, 1990, 1992), *habitus* – understood as a 'subjective but not individual system of internalised structures, schemes of perception, conception, and action common to all members of the

same group' (Bourdieu, 1977, p. 86) – is shaped and reproduced on the basis of historically constructed social structures and categories like class, gender, and ethnicity (see also Bourdieu & Passeron, 1977/1990). As such, habitus, inclusive of aspirations, is restrained by historically constructed social structures and categories, while the aspirational agency of students, is also primarily enacted within a past-time governed space.

One of many scholars inspired by Bourdieu, Hart (2012) expressly uses the Bourdieusian concepts of *habitus* and *field*, that is, social context, to analyse how aspirations are formed. Studying British youths' aspirations for higher education, Hart (2012) works with two types of aspirations: true aspirations and adapted ones. True aspirations, she explains, are those that students harbour for themselves and share freely with others, whereas adapted aspirations are those more apparent aspirations shared with and formed by specific others close to the students, for instance, family members and teachers (Hart, 2012, p. 97). Hart (2012) contends that because others shape adapted aspirations, these cannot be true aspirations. Moreover, true aspirations are unachievable, because habitus by nature is reproduced and formed both in certain social fields such as family norms and in educational fields such as teachers' expectations to social class, gender, and ethnicity (Hart, 2012). Thus, aspirations are formed by a past that prevents students from truly aspiring.

Closer to the field of STEM education, the UK-based ASPIRES project is also situated in a Bourdieusian framework, analysing how science and career aspirations are shaped among children and young people between the ages of 10 and 23. Scholars from this project have developed the concept of *science capital* (e.g., DeWitt et al., 2016; Archer et al., 2015; Moote et al., 2020), which has obvious roots in Bourdieu's original concepts of *social*, *cultural*, *economic*, and *symbolic capital* (Bourdieu, 1984), but is meant to describe 'a layering of

dispositions, produced through socialisation, which guide a person's sense of what is normal, possible and desirable for "people like me"' (DeWitt et al., 2016, p. 2432) in a context of science. In other words, the concept of science capital covers an individual's embodied resources, enabling them to navigate the field of science to a greater or lesser extent, depending on the classed, gendered, and racialised narratives they have been told through socialisation.

In one paper from the ASPIRES project, DeWitt et al. (2016) use the data generated from two different British surveys to seek out potential correlations between educational science aspirations and social class. They find that prospective science participation is commonly connected to students that already 'occupy quite a privileged position … with high levels of cultural capital and being in top sets at school' (DeWitt et al., 2016, p. 2443), further concluding that science aspirations are formed by historically constructed social structures and categories such as social class.

In another paper, Archer et al. (2015) similarly build on survey-generated data to find potential correlations between science aspirations and social class as described above. Consisting of survey responses from 3,658 English secondary school students, this dataset indeed showed correlations between science aspirations and social class, but also revealed science aspirations to be correlated with gender and ethnicity. In measuring different students' science capital scores, Archer et al. (2015) demonstrated that girls scored significantly lower than boys and that ethnically South-Asian students scored proportionally higher than ethnically White students. Accordingly, their findings support those of DeWitt et al. (2016) by underlining that historically constructed social structures and categories play a complex reproducing and shaping role in forming students' science aspirations (see also Moote et al., 2020).

A last paper, also developed from the ASPIRES project, centres specifically on gendered STEM aspirations among girls and is – ironically in light of this thesis' subject – called *Not girly, not sexy, not glamourous: primary school girls' and parents' construction of science aspirations* (Archer et al., 2013). In this third paper, Archer et al. (2013) use interview data to emphasise that gender plays a role in the forming of girls' STEM aspirations, thus demonstrating that the image of STEM as 'geeky' and 'brainy' (p. 188) does not fit the historical construction of desirable and intelligible femininity among girls. Consequently, girls eschew STEM educations even though many of them express an interest in STEM activities.

As the above presentation of the first body of literature implies, aspirations are shaped and reproduced by historically constructed social structures and categories that limit which futures students can imagine and thus aspire to. The literature demonstrates how aspirations are formed by past matters that constrain students from developing and acting on true aspirations, instead compelling them to develop aspirations adapted to family norms, teachers' expectations, and general conceptions of social class, gender, and ethnicity. Hence, the first corpus of literature points to the organising and governing of aspirations as rooted in reproduction and adaptation, for which reason the literature can also be stated to explain the past as a primary governor of aspirations.

Although having proven useful in explaining the organising and governing of aspirations, Bourdieu's theoretical ideas have been challenged by some scholars as having too deterministic a focus on the reproduced historical constructions of social structures and categories (e.g., Connell, 1983; Giroux, 1983; Nash, 1990). This holds true for the second body of literature, in which scholars assert that, by focusing on the past, aspiration formation scholars ignore student agency that might be found in the present. This corpus primarily builds on Appadurai's

contention that culture plays a key role in shaping aspirations since 'it is in culture that ideas about the future, as much as those about the past, are embedded and nurtured' (p. 59).

As seen, Appadurai (2004) finds that ideas about future life are formed in the present culture and thus in 'the thick of social life' (p. 67), and he consequently ascribes a key governing role to the present. Despite emphasising the present, Appadurai (2004) does not ignore the shaping role of the past presented in the first body of literature. Rather, he merges present and past, describing the capacity to aspire as the ability to 'read a map of a journey into the future' (p. 76) and therefore as an ability based on individuals' knowledge and experiences with navigating the symbols, drawings, and paths of maps. According to Appadurai (2004), the capacity to aspire thus entails an ability to use parts of the past to navigate the present towards the future, but not in the Bourdieusian sense, where the past has a reproducing function. Rather, the present culture – and the imaginations of the future for which this allows – gives individuals the opportunity to read knowledge and experience in relation to what is possible under the present circumstances, as well as supports individuals in negotiating between the desired and the possible (Appadurai, 2013).

Inspired by Appadurai's (2004) theoretical ideas, Gale and Parker (2015) analyse aspirations among disadvantaged Australian youth, including a specific emphasis on Appadurai's (2004) mapping metaphor. In their work, Gale and Parker (2015) merge Appadurai's (2004) work with de Certeau's (1984) work on tour and map knowledges, whereby tour knowledge refers to a sense of where people are and where they are going and map knowledge to a comprehension of the greater picture and more detailed directions on the various options for getting from one specific destination to another (Gale & Parker, 2015, p. 90). Thus, tour knowledge relies on a vague sensing, whereas map knowledge relies on information and

developed skills in reading ‘maps of the future’. In merging the work of Appadurai (2004) and de Certau (1984), Gale and Parker (2015) uncover an apparent over-reliance on tour knowledge among underprivileged students as they navigate their present toward aspired futures (p. 94). However, the aim of Gale and Parker (2015) is not solely to bring forward this empirical finding but also to introduce novel theory on how aspirations are formed within a dynamic interaction between the past and the present. As such, they highlight the role of the present in stating that the past might set certain limits for disadvantaged students’ ability to plan the journey into their aspired futures, but the present allows the students to act and react in ways that enable them to not solely reproduce the past as they travel into the future (Gale & Parker, 2015).

Another scholar inspired by Appadurai’s (2004) theories is DeJaeghere (2018), who focuses on gendered aspirations among girls in a Tanzanian community. DeJaeghere (2018) argues that gender norms often result in Tanzanian parents’ prioritising their boys’ education over their girls’ because girls are expected to marry and move away with their husbands’ families anyway. However, new trends are emerging, with more families valuing the fact that education can enable their daughters to help out the family before, or even after, they marry. These trends have led to more girls’ being allowed education and thus to aspire to labour market participation (DeJaeghere, 2018, p. 242). DeJaeghere (2018) cautions, however, that simply because girls have been allowed to aspire to labour market participation, it does not mean that they are also able to act on their aspirations. Accordingly, a newly created visibility that enables girls to see how to act on their aspirations can give them the option of entering the future they aspire to. DeJaeghere (2018) suggests mentoring as a tool to help girls imagine alternative futures in relation to the historically constructed social structures that surround them. Emphasising the necessity of providing girls with mentoring that helps them

see how to act on their aspirations within limiting social structures, DeJaeghere (2018) makes clear that aspirations and agency cannot be freely unfolded, but rather are shaped within 'a dialectic relationship, affected by structures that constrain futures and also present openings for possibilities' (p. 241). As such, like Appadurai (2004) and Gale and Parker (2015), she operates with the theoretical idea of the present as opening a new opportunity for aspiring, even though this present remains marked by the past.

Temporally speaking, the two above bodies of literature respectively focus on either past or present time in arguing how aspirations are organised and governed, although the second corpus acknowledges that the past cannot be fully ignored even when the present opens a path for aspiring to new and alternative futures. Having covered this ground, I now turn to the third and final body of literature, which addresses aspiration-raising policy, more explicitly how such policy attempts to organise and govern aspirations and shifts the temporal focus away from the past and present to the future as the main governing factor.

For instance, Sellar's (2015a) work compares the operations of aspiration-raising policy to the adverts found in airports, which are often spaces that invoke positive feelings of hope for new connections and excitement about novel explorations (p. 202). Sellar (2015a) argues that just as airport adverts promise a better and more desirable future if only one buys specific products, aspiration-raising policy makes promises 'about the relationship between education, economic growth and social mobility' (p. 202), thus suggesting that a better economic and social future can be attained through education. Hence, aspiration-raising policy operates by promising a better and more desirable future, thus shaping aspirations, Sellar (2015a) maintains, by assuring individuals that engaging with specific educations will give them the better and more desirable future promised.

More explicitly describing how aspiration-raising policy operates by promising such futures, Sellar and Storan (2013) directly state that 'Policy focused on aspiration generally includes promises about the future benefits of education' (p. 49). Moreover, they contend that the students that aspiration-raising policy targets get affected and motivated by the policy because they 'are promised a "good life" through education' (Sellar & Storan, 2013, p. 49), and thus maintain that better and more desirable futures are attainable through – often higher – education. As such, Sellar and Storan (2013) are clear about the organising and governing role the future plays in the shaping of aspiration, and the fact that aspiration-raising policy is 'operating through the production of desire and hopeful or optimistic affects…' (p. 49).

Also studying aspiration-raising policy, Spohrer et al. (2018) state that since the 2000s successive UK governments have embraced the raising of aspirations as a solution to persisting educational and socio-economic inequalities. These governments have thus presented aspirations, and hence entering and completing an education, as something that can improve people's futures by closing inequality gaps within education and the economy. As such, Spohrer et al. (2018), Sellar (2015a), and Sellar and Storan (2013) make similar arguments, agreeing that aspiration-raising policy forms aspirations by promising individuals that better and more desirable futures – in the form of more socially equal lives – can be theirs if they engage in educational activities. However, Spohrer et al. (2018) add a relevant social dimension to Sellar's and Sellar and Storan's work by contending that because aspiration-raising policy exclusively seeks to inspire aspirations among individuals, it often fails to deliver on its promise of better and more desirable futures. So, individual aspirations are not enough for individuals to succeed in education, they must also have certain contextual factors, such as financial status, access to schools, and academic and social resources going for

them to achieve their educational goals (Spohrer et al., 2018; see also Sellar & Gale, 2011; Sellar, 2013, 2016; Sellar & Zipin, 2019).

Finally, Archer et al. (2014) agree that aspiration-raising policy follows the narrative that education will bring individuals better and more desirable futures. These scholars concur with the aspiration-raising policy argument that inspiring aspirations can make it possible 'to build[ing] resilience among young people from disadvantaged backgrounds' (Archer et al., 2014, p. 59) and thus to give them better and more desirable futures. Although agreeing with this narrative, Archer et al. (2014) also agree with Spohrer et al.'s (2018) critique of the policy's individualism. However, in critiquing the focus on individualism, Archer et al. (2014) zero in on so-called '"high" aspirations' (p. 59), stating that policy so narrowly focused on inspiring such aspirations runs the risk of creating educational backlashes, meaning that only the privileged few are likely to enter the higher educations the policy targets with its high aspirations, and the rest will become educationally disillusioned as they seek to act on such aspirations.

From the above, one can surmise that the literature belonging to the third corpus states that the future organises and governs aspirations, whereas aspiration-raising policy additionally operates by promising individuals' better and more desirable lives through education. As such, the third body of literature also emphasises the future, and what individuals trust the future to hold, as the most relevant factor in forming aspirations, in contrast to the first body of literature, which makes the past the most relevant factor, and the second body of literature, which gives the present – partly marked by the past – the greatest importance. Thus, each of these corpora presents its own unique perspective on how aspirations are temporally organised and governed.

All three bodies of literature have proven useful in analysing the organising and governing of aspirations, and in this thesis, I greatly sympathise with them all. Nevertheless, with a specific focus on the literature from the third body of literature on aspiration-raising policy, I aim to challenge and nuance them by exploring whether aspirations are indeed organised and governed within times as neatly ordered as the literature seems to propose, or whether a new 'ghostly' (Pors, Olaisson & Otto, 2019; Derrida, 1994, 1999) – or diffractive (Barad, 2007, 2013, 2017) – understanding of time might more productively be applied to comprehend how aspirations are organised and governed. To this end, I will scrutinise the different temporal spaces within which aspirations are organised and governed and attempt to diagnose how times behave and move in organising and governing the STEM aspirations of girls. For instance, I will examine whether the future optimism that aspiration-raising policy points to is alone in organising and governing girls' STEM aspirations? Or might darker and more negative past times diffractively 'haunt' this time? Moreover, does this potentially result in affectively and temporally unordered spaces where girls' STEM aspirations are simultaneously organised and governed by forces from bleak past and bright future times? Below, I now turn to the literature on affective governmentality, which I – among other things – use to detail and explain the organising and governing operations and effects of aspiration-raising policy in Article 1.

**2.2 Affective Formations of Aspirations |** Foucault's original notion of *governmentality* (1991, 2009, 2010) designates a form of power centred on individuals' self-governing processes (see also du Plessis, 2021). As such, the notion pivots on the idea that power is not something a government exercises over the people, but that the people willingly exercise over themselves (Foucault, 1991). According to governmentality scholars, various productions of knowledge (Rose, 1996, 1999) and normative patterns (Fleming & Spicer, 2003) serve to

subtly persuade individuals to willingly self-govern, providing them with insights into the social behaviour and conduct required to be recognised as a 'normal' subject and thus to enjoy the privileges afforded to a subject considered as such. In his work on subjectivity, Foucault (1990), for instance, demonstrates how early medical books and texts gave individuals insights into sexuality and sexual behaviour that enabled them 'to question their own conduct, to watch over and give shape to it and to shape themselves as ethical subjects' (Foucault, 1990, p. 13). Indeed, Foucault (1990) described how the discourses – and thus knowledge and normative patterns – produced by early medical books and texts helped individuals to govern themselves towards specific sexual behaviour that would make them recognisable as 'normal' (hetero)sexual subjects, with 'abnormal' (homo)sexual subjects being denied privileges. Some of the aforementioned literature on aspiration formation similarly shows how some girls abstain from developing STEM aspirations and entering STEM education because such education does not fit the historical, social construction of a desirable and intelligible feminine subject that girls are expected to align with (Archer et al., 2013, p. 171). As such, the concept of governmentality covers the fact that individuals' social behaviour, including aspirations, dreams, and desires, are organised and governed through the discursive forming of knowledge and normative patterns, while also allowing social behaviour to be seen as something largely organised and governed by productions of discourse (see also Dean, 2010).

Although productions of discourse have often dominated the study of social behaviour (e.g., Kauppila et al., 2020; Raaper, 2015), in the last decade the organising and governing of such behaviour through productions of affect has come under (re)new(ed) scrutiny. This shift has led to a so-called *affective turn* (Clough, 2007; Gregg & Seigworth, 2010) in the social science field, with a large group of scholars now more closely studying the organising and governing effects

inherent in affect (e.g., Blackman, 2012; Brennan, 2004; Fotaki et al., 2017; Kenny & Fotaki, 2015; Pors, 2019; Staunæs & Pors, 2015; Pullen, Rhodes & Thanem, 2017).

A growing number of scholars have also attempted to add a dimension of affect directly to Foucault's work on governmentality, thus further developing his original concept into one of *affective governmentality*.[2] For instance, working in a context of OMS, Pouthier and Sondak (2021) demonstrate how affect had a disciplining effect on a group of women constantly exposed to their own presence through cameras installed in the art space they worked in. Indeed, a constant shameful awareness of how their bodies and behaviour looked to others was shown to govern the women to adopt a new and different behaviour they considered more usual. Similarly, Kantola et al. (2019) show how 'affective management' (p. 267) is practised in the globally operated Finnish metal and paper industries, and how managers deliberately use the production of different affective conditions to prime the behavioural actions of employees in these industries. As such, Kantola et al. (2019) demonstrate how top executives incite and orient their employees' work behaviour by using affective threats and promises to orchestrate a work milieu that oscillates between danger and optimism. Finally, my own work illustrates how the management tool of mentoring, which is designed to increase the representation of women in leadership, produces various (dis)comforts among women that aspire to become managers. My work shows how the management tool governs women to adopt a masculine behaviour by shaming feminine behaviour and investing a promise of happiness in masculine behaviour (Sandager, 2021).

[2] It should be noted that affect and affective elements have not been totally ignored in Foucault's work on governmental regimes and governmentality. However, as Foucault never discussed the significance of affect or emotion in-depth, it seems fair to state that something novel is found in the current work on affective governmentality (see Kantola et al., 2019).

The development traced to OMS can also be traced to education studies. Focusing on teacher–student relations and teacher–student conversations as specific affect-inducing technologies, Bjerg and Staunæs (2011) have illustrated how a teacher evoked shame in a student to get him to adopt a behaviour of improvement. Scrutinising higher education and racialised behaviour, Dar and Ibrahim (2019) have built on Bjerg and Staunæs' (2011) argument to show how bodily discomfort and shame are used to govern 'Blackened' women towards silence in the 'White academy' (p. 1242) and thus to sustain a racialised and gendered hierarchy in this academy. To explore affective alternatives to discomfort and shame, Shoshanna (2021) interviewed former students at an Israeli state-run boarding school for disadvantaged students, using the data to demonstrate how a strategy of evoking gratitude was deployed to make these students align with specific governmental-educational objectives. Last, although never using the term 'affective governmentality', Sellar (2015b) refers to both 'affect' and 'governmentality' (e.g., p. 140), thus bringing the concept into an educational policy context by demonstrating how policy actors attending meetings and social summits contaminate each other with different affects and thus govern each other's behaviour and policy actions. Sellar's (2015b) study indicates that policy issues clouded with negative affects like fear call for more drastic policy actions than issues carrying positive hope and thus possibly requiring no action at all (see also Pors & Ratner, 2017).

As shown above, there are many theoretical approaches to developing, analysing, and applying an affective governmentality. However, these generally fall into two schools of affect theory. One school sees affect and discourse – and thus affect and emotion – as separate matters (e.g., Thrift, 2000, 2004; Deleuze, 1997). For instance, Massumi (2002) argues that 'emotion' is 'a subjective content, the sociolinguistic fixing of the quality of experience which is from that point onward

defined as personal', whereas affect is pure bodily 'intensity' not (yet) contaminated by discourse (p. 28). Similarly, Thrift (2004) sees affectivity as another way of experiencing the world and oneself than cognitive reflexivity, and as an experience that occurs in a bodily register rather than a rational register of discourse.

With the exception of my own work, the above scholars' work on affective governmentality builds on the affect theory under the first school. However, the second school has largely critiqued this theory, maintaining that affect and discourse are inseparable. As such, affect and discourse cannot be seen as matters operating in parallel, but must rather be viewed as existing in and through each other, with discourse unavoidably producing affect and vice versa (Hemmings, 2005; Wetherell, 2013; see also Stenner & Moreno, 2013). An example of this can, for instance, be found in a body walking through a neighbourhood it has repeatedly been told is ravaged by crime. An affective state interpreted as fear suddenly strikes the body, for which reason it exercises more caution during the walk. This example shows how the body discursively categorises the affective state it reaches as fear and not joy or pleasure because it *knows* that a dangerous neighbourhood evokes fear and not affects like joy or pleasure. Moreover, the example illustrates how the affective state discursively categorised as fear leads the body to *make sense* of how to react to the neighbourhood and thus to navigate it with greater caution and alertness. In this way, the example also shows how discourse evokes affect, just as affect evokes discourse (see e.g., Bissenbakker, 2012).

In this thesis, my inspiration is rooted in the latter school, more explicitly Sara Ahmed's (2004a, 2004b, 2006, 2010) queer feminist theories on affect. I first encountered Ahmed's work while writing my master's thesis at Copenhagen Business School, and her theories on affect have since come to shape most of my

work, although – as I explain in the Methodology – I have sought to take some detours into other work on affect. Ahmed herself describes her work as lying at the intersection of 'feminist, queer and race studies' and as being 'concerned with how bodies and worlds take shape; and how power is secured and challenged in everyday life worlds as well as institutional cultures' (Ahmed, n/d). As such, the aim of Ahmed's work fits that of this thesis not only in seeking to understand how (glittery) worlds take shape, but also in seeing how power comes to (re)produce and (re)constitute particular forms of social behaviour. Moreover, Ahmed's work is highly relevant to the thesis' research question(s), because – as I will demonstrate below, as well as in the Analysis – it examines affect and how it relates not only to the body but also to factors that are not just the body, such as time.

Because Ahmed's work is my primary inspiration, in both Articles 1 and 3 I use her theories to analyse how social behaviour is organised and governed through the affective conditions provoked by and contained in the body, but also by discourse and various objects, including the objects of times. In Article 1, I describe how Ahmed (2010) sees affect and discourse as becoming one in objects because discursive narratives invest affective meaning in these objects. At the same time, this affective meaning is also transferred to our bodies in the instant they encounter the objects. Take, for example, the body struck by fear as it enters a high-crime neighbourhood and suddenly exercises more caution. One could explain this incident as a matter of discursive narratives having invested the object of the neighbourhood with an affective meaning of something fearful, even as the fear is also transferred to the body in the instant it encounters the neighbourhood and then adopts a behaviour of greater caution. In Article 3, I further show how Ahmed (2004a, 2004b) sees affect and discourse as becoming one in objects because, as Ahmed contends (2004a, 2004b), affects have a *sticky* character that

allows them to adhere to objects. In making this argument, Ahmed (2004a, 2004b) concentrates on how affects come to overlay objects through discursive narratives about them while also being transferred to our bodies when we come into contact with the objects. She, for instance, cites an asylum seeker as an example of how fear can come to stick to the object of this subject's body because continuous discursive narratives communicate that this object is a dangerous criminal and job thief (Ahmed, 2004a).

Applying Ahmed's theories, I endeavour in Articles 1 and 3 to contribute to the literature on affective governmentality by bringing in a new focus on how affect organises and governs social behaviour. In these articles, I build an understanding of how girls' social behaviour is organised and governed not by isolated bodily affect, but by bodily affect evoked because of its relationships with discourse and different objects. Accordingly, I also use the articles to undergird my choice of not distinguishing between affect and emotion in this thesis and thus employing the two concepts interchangeably. However, I would also like to take a moment here to briefly 'defend' my choice, as I am aware that it is open to criticism – see the arguments of Massumi (2002) and Thrift (2000, 2004) above – and that the differences between affect and emotion have long been debated (see Hemmings, 2005; Wetherell, 2013). My theoretical armour for this choice is forged from Ahmed's (2010) theories, more specifically the following statement:

> The distinction between affect/emotion can under-describe the work of emotions, which *involve* forms of intensity, bodily orientation, and direction that are not simply about 'subjective content' or qualification of intensity. Emotions are not 'after-thoughts' but shape how bodies are moved by the worlds they inhabit. (p. 230, original emphasis)

As seen from the quote, Ahmed underlines that affect and emotion in many ways operate similarly, their both moving and guiding our bodies. Thus, although my decision to work with affect and emotion interchangeably can be contested, I still make this choice deliberately and without fear of it disturbing or complicating the arguments and findings of the thesis. Indeed, the aim of the thesis is not to discuss the nuances between affect and emotion, but simply to point to the relevance of focusing on bodily reactions – affective, emotional, or both – and on discourse as well as objects, when one seeks to understand the organising and governing of social behaviour.

Besides putting an additional spotlight on how affect organises and governs social behaviour in Articles 1 and 3, I also develop a novel theoretical concept of affective governmentality that can help scholars analyse how such behaviour is organised and governed. This novel concept can be seen as one that ensures a focus on all the different matters – not just the internal bodily registries – one needs to consider to understand how social behaviour is organised and governed. As such, this novel concept can aid in the analysis of how discursive narratives invest and stick various positive and negative affects in and to different objects, as well as make subjects either adopt or abandon these objects. For instance, in a context of aspiration-raising policy and such policy's organising and governing of social behaviour, the concept can assist with an analytical focus on how policy produces affect specifically by producing discursive narratives that invest different affective meaning in the objects of times. Hence, the concept can ensure an explicit focus on the organising and governing affective and temporal operations and effects of aspiration-raising policy that the literature on aspiration-raising policy points to when arguing that the policy organises and governs social behaviour through promising better and more desirable futures. In a context of OMS, the concept can further help one to analyse how social behaviour might be

organised and governed through discursive narratives that invest affective meaning in the objects of different organisational goals in addition to the non-discursive governance that the OMS scholars above point to. Moreover, the concept can assist one in understanding how social behaviour and relations between subjects are organised and governed on the basis of certain affects sticking to the bodies of these subjects, and that subjects not only read and understand each other on the basis of discursive communication, they also *feel* each other.

I continue to develop on my novel concept of affective governmentality throughout the thesis, and in the Discussion return to discussing the new understandings and insights the concept can bring us. However, I first endeavour to build a new concept of glitter, one that encompasses the affective organising and governing of social behaviour. In this way, I take the initial steps towards thinking of glitter as a concept of broader relevance in mainstream OMS, even if at first glance the concept appears to be a rather whacky phenomenon that solely belongs in niche forms of study.

**2.3 The Formatting Potential of Glitter |** I was first introduced to Coleman's theories on glitter during a visit to the University of Melbourne, where my supervisor, Signe, had just received a copy of Coleman's book *Glitterworlds: The Future Politics of a Ubiquitous Thing* (2020). I was immediately drawn to the book, both by its pretty, sparkly cover, but also because I had been interested in glitter – or 'confetti', as I less directly referred to it at the time – ever since encountering the glittery world of STEM. My stay in Melbourne was abruptly cut short by the news that Denmark was imminently closing its borders due to the COVID-19 pandemic. Dropping everything, I rushed home, and once there it took me some time to get around to ordering – and to receive – the book from Amazon. I read the book during that first lockdown, and as the thesis undoubtedly reveals,

Coleman's work has been a profoundly formative inspiration for my work. Indeed, one could rightly say that Coleman's book has become for me what Ahmed calls a 'companion book[s]', understood as a book 'that allow[s] me to meet myself in a different way' (Ahmed, 2017, n/d), its having brought new meaning to the pre-pandemic work I had done on the thesis.

According to Coleman (2020), glitter is a thing – a material thing in the form of 'a collection of small, reflective plastic fragments that comes in different colours and shapes, reflecting light at various angles so that it sparkles' (p. 1), but also an immaterial thing, a medium that communicates different information depending on who engages with it (p. 23). As such, Coleman (2020) argues that 'thingness is both material and immaterial, a series of properties and communicative capacities' (p. 6). Although describing glitter as (im)material, Coleman (2019, 2020) nevertheless focuses on the materiality of glitter and how this materiality communicates. For instance, it communicates something to and about girls that it does not communicate to and about boys, and something to one class and race that it does not communicate to another (Coleman, 2020).

In this thesis, my reading of glitter differs from that of Coleman (2020, 2019), because I see it as not only communicating materiality, but also as being communication. As such, I conceptualise glitter as a material/discursive concept that simultaneously values focusing on and analysing materiality and discourse. Accordingly, I remain faithful to Coleman's (2020, 2019) reading of glitter while *also* theorising glitter as taking other forms that make a phenomenon sensational and enchanting – and thus alluring. Examples of such glitter might include greater attention from the policy field or investments made with major social and economic resources from the private sector. In other words, I broadly conceptualise glitter as materiality that creates glittery, gleaming surfaces, but also as the production of a positive affective sense-making.

As I begin writing of glitter in an affective governmentality context and as something that creates a positive affective sense-making, these words of Coleman (2020) strike me as a good place to start: 'Glitter also sticks everywhere. It sticks to what it is and isn't intended to, and travels beyond its original uses, *eliciting affects and emotions* from delight to irritation' (p. 1, emphasis added). This sentence reveals how glitter produces affects that – according to the above theories on affective governmentality – will inevitably move, lead, and guide bodies in some way. In the framing parts of this thesis, I will primarily concentrate on productions of positive affects, as I will focus my attention on an intentional 'sticking' of glitter and thus its deliberate use to produce positive affects. As such, I argue that gendered educational STEM policy sprinkles alluring glitter on STEM in an attempt to govern more girls to develop STEM aspirations.

My use of words like 'sprinkling' and 'intentional' might be somewhat misleading expressions of what I understand glitter to be and do. To me, glitter is more than a superficial materiality someone can liberally throw onto a given matter to give it a glimmery shine; it is also discourse, something that gets incorporated into, say, the multifarious elements binding together the whole world of glittery STEM. As such, not just one, but many actors collaborate to shape STEM as glittery and alluring. More specifically, policy alone does not establish and maintain STEM as alluring; so do (girl) students entering STEM educations, parents buying STEM toys, the people attending technology companies' many events, not to mention the events in themselves. Indeed, my own work, including this thesis, serves to make STEM glittery by giving STEM positive attention.

Although describing policy as intentionally sprinkling glitter on STEM might imprecisely express my understanding of glitter and its effects, I deliberately use this formulation to maintain the thesis' focus on gendered educational STEM policy and its actions and effects, and not on the actions and effects of any other

policy or actor. Moreover, I see gendered educational STEM policy's actions as intentional: I see formal policy actors as producing glittery communication and commercial and market-driven policy actors as producing glittery Barbies with the direct aim of fostering STEM aspirations in girls. However, I certainly acknowledge that gendered educational STEM policy is not alone in sprinkling glitter on STEM, and that unintentional actions and practices, such as writing this thesis, also discursively infuse STEM with glitter. As I will also demonstrate throughout the thesis, I additionally see glitter as something that performs as it is intended to but indeed also as it is not. As such, my only objective here is to signal a particular focus on gendered educational STEM policy and its organising and governing effects, as the thesis' research question(s) corroborate.

With regard to glitter as producing positive affects, Coleman (2020) argues that this production carries a transformational potential in bringing highly specific worlds to life. Coleman (2020) writes:

> Glitter … is lively and energetic, or vibrant. It is part of what constitutes or worlds worlds. Worlds do not exist in quite the same way without glitter as part of their mix. I am not claiming that glitter is the only thing or always the most important thing in the worlds … but that in being in, becoming with, these worlds, it changes these worlds. The worlds become, differently, because glitter is part of them. It is in this sense that a *future politics* of glitter emerges. In its dynamism and constitution of worlds, glitter is transformational. (p. 5, original emphasis)

As such, Coleman (2020) contends that worlds are 'worlded' in new and different ways when glitter is in the mix. Consequently, the world of STEM must also become something new and different when gendered educational STEM policy sprinkles vibrant glitter on it and thus includes shimmery shine in its mix. The

quote shows that a 'future politics' is implicit in the 'worlding' of new worlds. In worlding in new and different ways, glitter involves a new and different future-making; that is, when transforming the present into something new, glitter also organises new futures of and for the present (Coleman, 2020, p. 7). This makes glitter a mediator for the production of a range of new futures as well as for the different futures young people (can) imagine.

Glitter mediates the production of not only new, but also better and more desirable futures (Coleman, 2020, p. 7). To illustrate this, Coleman (2020) refers to her work with a group of teenage girls in a workshop setting aimed at future-making, describing how they were asked to create collages of the futures they envisioned and desired. In this exercise, Coleman (2020) gave the girls the opportunity to work with a variety of such crafting materials like magazines and a Polaroid camera as well as shiny material glitter and lustrous glitter tubes. Arguing that glitter appealed to the girls in positively affective ways, Coleman (2020) explains how the girls were drawn to using the various glittery materials when engaging with positive future scenarios. She details how the girls arranged glitter in heart shapes and other love symbols and used it to frame words and images they felt depicted the good life. Some girls used glitter to frame the images of female celebrities they believed were flourishing in fame and success, thus utilising glitter, Coleman (2020) argues, to make 'their futures shimmer and sparkle' (p. 68) in positive ways.

In defining glitter and its sparkly performativity, Coleman (2020) draws on the work of Kearney (2015), who states that sparkle is something firmly planted in mainstream girl culture. Kearney (2015) argues that 'sparkle is so ubiquitous in mainstream girls' culture – and so absent in boys' – it vies with pink as its primary signifier of youthful femininity' (p. 263). As such, Kearney (2015) emphasises a gendered aspect of sparkling glitter, an aspect further underlined when she

contends that glittery sparkle especially serves to visually illuminate 'girly' matters in mainstream culture and thus to draw the attention of and to girls (Coleman, 2020, p. 68). Kearney (2015) indicates that sparkly glitter, not having positive connotations for everyone, is instead used to attract the attention of very specific gendered subjects and to very particular gendered matters. Hence, glitter produces not only new, better, and more desirable futures but also very specific new, better, and more desirable *gendered* futures.

As seen above, the theories of Coleman (2020) and Kearney (2015) ascribe a political aspect to glitter. Glitter creates specific (glitter)worlds, thus setting highly particular normative standards for girls' bright futures. Moreover, glitter has a powerful allure in attracting girls through illumination and, indeed, through the production of positive affects. As such, it makes sense to consider glitter as an instrument that can be used to affectively organise and govern social behaviour, and therefore to place glitter in a context of affective governmentality. For the remainder of this chapter, I therefore build on the idea of glitter as belonging in a context of affective governmentality by (1) further scrutinising the illuminating and colouring effects of glitter and thus exploring the more sensory aspects of the affects it produces and (2) adding time perspectives to glitter other than the future perspective Coleman (2020) introduces. Drawing on theories of time and temporality, I aim to underline how glitter produces affects as well as to nuance its organising and governing effects, thereby interrogating whether glitter can be considered a reliable instrument for affectively organising and governing the social behaviour it is intended to. As such, I also attempt to analyse the many organising and governing potentials – and pitfalls – of glitter, which Coleman (2020, 2019), having other interests, does not explicitly address in her work on glitter.

**2.3.1 Glitter, Light, and Colour |** Coleman (2019, 2020) has already examined the more sensory aspects of the affects produced by glitter, an examination that Coleman (2019) details when recounting her trip back to the university after facilitating some of the future-making collage workshops. Coleman (2019) writes: 'After the workshops on the bus to work with a large bag and a suitcase of material and completed collages, I noticed that glitter clung to my clothes and body' (n/p). She goes on to explain how the glitter used at the workshops strayed from the classrooms and the girls' collages, sticking to her body and thus travelling with her. By describing glitter as something that sticks to the body and thus stimulates the tactile sensing of the skin, Coleman (2019) shows how glitter creates affect as not only an internal matter but also an external, sensory matter.

As I explicate below, I have developed my new material/discursive concept of glitter with an emphasis on another sensory dimension of affect: sight. However, I would like to briefly dwell on this sticky quality of glitter – which resembles the more immaterial sticking of affect to which Ahmed (2004a) points. Indeed, this quality indicates that glitter cannot simply be discarded when one no longer cares for it, and thus seems key to understanding the organising and governing effects of glitter, as it indicates that these effects are long-lasting. Moreover, this stickiness indicates that glitter is not so easily controlled, since it acts – and thus organises and governs – independently and regardless of our original intentions (Coleman, 2020). I return to these points about glitter's unruliness in the following section on time and temporality.

By focusing on the sense of sight rather than touch, I turn my attention to glitter's specific capacity to 'reflec[t] light at various angles' (Coleman, 2020, p. 1) and thus its ability to illuminate, brighten, and shine (Kearney, 2015). As such, I explore how glitter produces specific sight, but also blindness – and therefore

ignorance[3] – which makes us experience the world in highly specific ways. In other words, in developing my new concept of material/discursive glitter, I analyse how glitter makes us see, sense, and make sense of very particular worlds, and how it thereby organises and governs very specific social behaviour because we humans logically act and react in relation to the world we experience.

As I embark on my line of argument, I turn to another seemingly odd choice of reference for a PhD thesis, albeit perhaps one less odd than a Pete Doherty quote: a statement made by Carrie Bradshaw, the glamourous main character of the sparkly and fashionable HBO show *Sex and the City*, during a conversation with another character, Samantha Jones, in a busy, buzzing NYC park. The statement aptly explains how, in illuminating specific matters, glitter creates particular sights, but also a blindness that leads one to ignore other non-glittery matters. As the two women discuss Carrie's work frustrations, Carrie suddenly stops short and, disoriented, dramatically shakes her head, exclaiming, 'Okay, I'm not sure what you just said, because I was temporarily blinded by a piece of jewellery!' (*Sex and the City*, Season 5, Episode 2). The source of her sudden outburst is a dazzling diamond ring on Samantha's finger. Thus, Carrie's exclamation ostensibly demonstrates how Carrie, allured by Samantha's glittery ring, becomes blind to everything but the glittery diamond: the ring is what Carrie sees and is *all* she sees (and hears for that matter).

Below are two screenshots from the *Sex and the City* scene. They depict Carrie's outburst as well as her directed attraction to the glittery diamond ring on Samantha's finger.

[3] I owe a big thank you to my very dearest colleague Birke Otto for pointing me in the direction of thinking of glitter in lines of ignorance.


I'm not sure what you just said...
because I was blinded by jewellery.
Sex and The City
S5:E2:Unoriginal Sin

[Credit: HBO]

Notably, Carrie's outburst could indicate that glitter produces a kind of blindness that can – paradoxically – blind one to shiny glitter itself. If so, Carrie appears to have hardly noticed Samantha's dazzling ring even as she is supposedly being dazzled by it. As such, Carrie's statement and reaction could suggest that she has noticed only a bright, blinding light, which also leads her to closely inspect the ring when she regains her sight. 'Let me see that!' she exclaims, grabbing Samantha's hand to actually scrutinise the ring.

Although curious to explore the notion that glitter can create total blindness and thus total ignorance, I will continue on the line of thought that glitter makes itself – and all that it touches – visible by attracting and reflecting light and thus bringing things into sight, but thereby leaving other matters blindly ignored in darkness. To this end, I now turn to theories of light and colour, as they can help me pursue the idea that glitter makes us see, sense, and make sense of a very particular world, while it also allures us to adopt and abandon very specific social behaviour. I will then augment these theories with theory on time and temporality to further nuance the organising and governing effects of glitter.

In analysing the 'sociality of light' (p. 266), Bille and Sørensen (2007) make the argument that 'light works as a significant constituent of experience' (p. 265), further contending that 'light is more than just a medium; it evokes agency' (p. 264). As such, Bille and Sørensen (2007) also assert that light constitutes and shapes specific experiences, which again evokes agency. This assertion is supported by the work of Edensor (2012), who more explicitly describes some experiences light is used to create, thereby pointing to the specific agency light can evoke. Thus, Edensor (2012) states that light is used to 'enhance safety and mobility, facilitate surveillance, foster domestic intimacy and style, broadcast commercial advertising, fashion signposting, selectively highlight buildings to reinforce state and corporate power, promote festivity, and generally expands the

uses of the city at night' (p. 1106). He also explains how this makes light an important factor in getting individuals to experience the world in ways that organise and govern actions such as daring to walk in high-crime neighbourhoods, buying specific commercial products, and trusting in the power of the sovereign state.

Although light is seen as driving the creation of experience, it organises and governs social behaviour because it produces not only illumination but, in illuminating, also darkness. Accordingly, as we humans strategise how to behaviourally navigate the world, light establishes spaces we see and are aware of as well as contrasting spaces to which we are blind and thus ignorantly unaware of (Edensor, 2012; Thibaud, 2011). For instance, Edensor (2012) argues, light exists in a complex and intricate relationship with its opposite, darkness, whether through 'multiple shades and shadows, or a contrast between illuminated and unilluminated space' (p. 1106). Bille and Sørensen (2007) further contend that 'the appearance of the world is determined by the changing lightscapes cast by the shadows in the relationship between things, persons and light' (p. 266). Hence, like Edensor (2012), Bille and Sørensen (2007) indicate that we come to see, sense, and make sense of a very particular world precisely because light operates in ways that bring some things to our optic attention – catch the eye – and leave other things out of this attention. As such, they also suggest, light creates reality by brightly illuminating parts of the world, but likewise by leaving other parts in obscure dimness. In other words, light constitutes a very particular world by simultaneously producing sight and blindness. We trust the world as being a certain way because we only see some parts and are kept blind to others.

High*lighter*, that glittery cosmetic powder used to attract and reflect light to highlight specific parts of the physical body, provides an apt illustration of light's ability to create reality through simultaneous productions of bright illumination

and darkness, and thus of sight and blindness. Highlighter is usually dabbed on the face to accentuate areas that one wants to draw attention to. In that way, highlighter's quality lies in how it creates the illusion of special face contours by attracting light to certain facial zones while leaving others in darkness. Highlighter applied to the bridge of the nose creates the impression of a narrow(er) nose, as it ensures that light and thus sight are attracted to this slenderest part of the nose while diverting the attention from the broader nostrils, which are left in shadow on both sides of the illuminated nose bridge.

Below is a picture of reality-TV star Kim Kardashian, who – together with her sisters – has made the strategic use of highlighter famous. In this picture, one sees how Kim Kardashian uses highlighter to attract light to her nose bridge as well as forehead, cheekbones, eye corners, and chin. She leaves other parts of her face in darker shadow to create the illusion of a face with a very particular character and shape.

[Credit: https://reallyree.com /]

I would like to end this introduction to light theory with a quote by Bille and Sørensen (2007):

> To understand what things *do* to people, which is central to all material culture studies, is in part to understand the network between light, surfaces of objects (walls, things, floors, persons), and *the colour nuances and contrasts this creates and which shapes a visual atmosphere and ways of experiencing the world*. Naturally, there are other aspects in addition to this, which create a certain atmosphere, such as incense, heat, sound, air quality or the tactile qualities of the objects. The social responses to such experiences are varied; however, the point to be made is that *using light and its role in every culture is an active component of social life*. (p. 273, added emphasis)

The quote *highlights* that one can use light and thus light-attracting and -reflecting glitter to orchestrate very specific experiences that come to organise and govern social behaviour.

For the remainder of this section, I will further explore the 'colour nuances' to which Bille and Sørensen (2007) refer in the quote. This is because colour theories arguably underline the important role glitter plays in the organising and governing of social behaviour. Against this background, colour can be described as something that 'fills and forms the world, shaping what can be felt and known, desired and expressed' (Beyes, 2017, p. 1467), and thus as something that shapes affect (what can be *felt*), discourse (what can be *known*), aspirations (what can be *desired*), and social behaviour (how it can be *expressed*) (see also Beyes & De Cock, 2017).

Although perhaps not purely colour, glitter is *also* colour. In the Coleman (2020) quote above, she states that glitter is 'reflective plastic fragments that come in *different colours*' (p. 18, added emphasis). Coleman (2020) is probably referring

to multi-coloured glitter, but this also covers monochrome glitter, whose individual bits attract and reflect light in ways that radiate glinting bursts of changing hues. The below unstaged photo of my own glittery iPhone cover serves to show this phenomenon. Although made of monochrome silver glitter encased in clear plastic, the cover still radiates a sparkling rainbow of countless colours as each bit of glitter individually and uniquely attracts and reflects the light.

The above arguments align glitter and colour in a way that seems not only fair but also essential. This alignment becomes even clearer when one considers that colour, like glitter, affectively moves the body via a visual, affective sensing (Beyes & de Cock, 2017); that it 'shines and wants only to shine' (Heidegger, 2002, p. 25); and that it 'simultaneously reveal[s] and conceal[s]' (Beyes, 2017, p. 1468) in producing both sight and blindness. Thus, it also seems essential to contend that glitter, like colour – or rather glitter *as* colour – 'shap[es] what can be felt and known, desired and expressed' (Beyes, 2017, p. 1467) and therefore

organises and governs social behaviour in constituting specific (affective) realities for us.

**2.3.2 Glitter, Time, and Temporality |** As shown above, glitter 'worlds' worlds in new ways, and the new and different future-making this involves leads to other, better, and more desirable gendered futures (Coleman, 2020; see also Kearney, 2015). In a context of Ahmed's (2010) theories and affective governmentality, this also ascribes a certain temporal governing dimension to glitter. Put differently, because glitter organises better and more desirable gendered futures, thus investing desirable positive affects in the object of the future, it becomes something that organises and governs girls' movement from the present into the future (Ahmed, 2010). This temporal governing dimension of glitter in an affective governmentality context implies that time, being multiple rather than singular (Pors, Olaison & Otto, 2019; Vaaben & Plotnikof, 2019), operates within the categories of past, present, and future times, taking one from one and on to the next. As such, although perhaps not directly linear, time moves in future-oriented ways that motivate a progression towards the better and more desirable futures organised by glitter (Ahmed, 2010).

Because glitter is assumed to have a certain temporal division and linear progression, I want to challenge these assumptions by introducing the time and temporality theories found in Barad's (2007, 2010, 2013, 2017) queer understandings of the world and add them to my new material/discursive concept of glitter. Barad, like Ahmed and Coleman, has influenced my own work greatly. However, as much as I instantly loved Ahmed and Coleman, Barad and I had a rocky start. Although Barad's theories dominated some initial drafts of this thesis, I struggled to grasp their cryptic STEM-related language, even desperately seeking to delete their perplexing and 'mechanical' work from the thesis entirely. Ultimately, however, Barad and I may not always speak the same language, but

we do subscribe to the same foundational queer understandings of the world, which I elaborate on in the Methodology. Consequently, their theories continued to linger in the thesis even after their concepts, terminology, and name were removed, and I had to make the effort to translate Barad's STEM-related language in a way that usefully opened their theories to me. Thus, I may not have fallen for Barad at first sight, but my love has slowly deepened, and by now Barad and I are probably destined to be together, if not for life, then for my career in academia.

Arriving in feminist and queer studies from quantum physics and mechanics, Barad has a take on the social world that is largely inspired by the STEM world this thesis explores (Barad, 2007, p. 25). Barad (2007, 2013) looks to STEM's many natural laws to analyse social behaviour, finding, for example, similarities between the behaviour of atoms, protons, time, and temporality and that of subjects. Barad (2007) thus aims to deconstruct – or queer – any hierarchical relations between time, space, matter, and sociality, arguing that all phenomena, material as well as social, exist on the basis of *intra-actions* between different (im)material matters. By intra-action, Barad means that nothing exists as an independent entity; everything exists as part of an entanglement with something else. As such, matters do not *inter*act as autonomously existing entities, but rather *intra*-act, existing only and being only able to exist as part of a larger entanglement of matters (Barad, 2007, 2017).

Being inspired by Barad's theories, I subscribe to the idea that times exist diffractively. Barad (1996) largely defines *diffraction* as the 'entangled nature of differences' (Barad, 1996, p. 381), thus seeing different times as existing in and through each other. Past, present, and future times have no singular or independent existence, they all exist because of each other. In asking one to 'imagine … possibilities for new imaginaries of time' (p. 17), Barad (2013) defines diffractively existing times as follows:

> This ‘beginning’, like all beginnings, is always already threaded through with anticipation of where it is going but will never simply reach and of a past that has yet to come. It is not merely that the future and the past are not ‘there’ and never sit still, but that the present is not simple here-now. Multiple heterogenous iterations all: past, present, and future, not in relation of linear unfolding, but threaded through one another in a nonlinear unfolding of spacetimemattering, a topology that defies any suggestion of a smooth continuous manifold. (p. 18)

With this statement, Barad (2013) argues that times cannot simply be differentiated or hierarchised. One time exists because of, and only because of, other times: without the past no present or future, without the present no past or future, and without the future no past or present. Accordingly, in the above Barad further deconstructs the idea of time as operating linearly and thus as moving us from past to present to future times. They illustrate how anticipations of future times thread present times, while past times are also constituted in present and future times.

To illustrate the nonlinear, non-hierarchical intra-action of time, Barad (2017) invokes the example of Hiroshima and the atomic bombing of the city in World War II. Barad (2017) describes how the past exists in the present disabled bodies of Hiroshima, which carry cancer in their cells, still poisoned by existing radiation from the past bombing. Moreover, Barad explains, future also unequivocally exists in these disabled bodies, as their cancer-ridden cells point to premature death rather than prolonged life. Thus, these bodies evidence how past, present, and future times are hard to disentangle, their all bringing existence to each other in the materiality of a disabled body.

Barad's example of the disabled bodies of Hiroshima points to a theory of time exceptionally relevant for thinking about time in relation to glitter. Indeed, Barad's theory on time also focuses on materiality – note their reluctance to differentiate and hierarchise between different matters – as well as explains time as something materialised. Times exist because of their relation to materiality and vice versa, for which reason the partial materiality of my material/discursive glitter concept is in fact time: glitter does not just communicate new, better, and more desirable gendered futures, the material part of glitter *is* those futures. Hence, time and temporality are not simply abstract, invisible structures commonly agreed on to organise social life, they are also materiality and thus readable from materiality.

The temporal dimension ascribed to glitter becomes troubled when one deconstructs time as something that operates within ordered categories and moves us from past to present to future times. Indeed, glitter produces the positive future gendered time it is theorised to, but such time is destined to be threaded by past, present, and alternative future times. Thus, when glitter produces new, better, and, more desirable gendered futures, it brings along a plethora of other unintended times. Past struggles that we trusted were long gone and overcome can very well remain a forceful part of glittery, better, and more desirable futures. Similarly, alternative futures will unavoidably be part of the glittery, better, and more desirable futures. In other words, glitter might not produce the unique and specific organising and governing effects it is intended to, instead producing a further range of other and further effects.

The theories on time and temporality presented above emphasise the unruly, uncontrollable, and unpredictable character of glitter, to which the sticky quality of glitter already points. Moreover, the theories arguably alert one to the danger of glitter's blinding character, as when the better and more desirable gendered futures sparkle and shine, they also allure our sight and attract us, maybe leading us to

overlook the (potentially dimmer) past, present, and alternative future times that inevitably linger, lying concealed within them. However, such (potentially dimmer) past, present, and alternative future times are not necessarily meant to disturb these glitterier futures, we may simply fail to notice that they are there able to do so. Therefore, theories on time and temporality underline that glitter should be sprinkled with caution, its being a substance and communication we cannot simply control or figure out.

**2.3.3 My New Material/Discursive Concept of Glitter |** Inspired by the work of Coleman (2020, 2019), my new concept of glitter similarly sees glitter with its shimmery shine and glowing materiality as producing positive affects and thus alluring positive attraction. However, I embellish Coleman's (2020, 2019) theories with the notion that glitter indeed communicates, but is also pure communication in the sense that communication can endow a phenomenon with a glittery appearance by constituting it as striking, sensational, enchanting, and thus alluring. This added dimension moves me away from Coleman's (2020, 2019) definition of glitter as communicating materiality, thus enabling me to develop a new material/discursive concept of glitter that values both materiality and discourse as a focus in analysing what glitter is and does.

As I develop my new material/discursive concept of glitter, I combine the current theories on glitter with theories of light and colour, emphasising the organising and governing effects of glitter. These theories help me call attention to how glitter attracts and reflects light in specific and colourful ways, and how it thus makes us see, sense, and make sense of the world in very particular ways that organise and govern social behaviour. I further deploy these theories to construct glitter as a conceptual lens that serves to shed light on potential blind spots, and as a concept that helps reveal potentially disturbing factors that – being outside the field of line of sight produced by glitter and therefore concealed in darkness –

might unnoticeably counter the organising or governing intentions behind sprinkling glitter. This is not to say that countering dangers will necessarily be hiding in the dark shadows of glitter, even though this thesis will focus on such dangers. The dark shadows could also hide productive matters, understood as something that could bring us new, helpful insights. In that way, the danger of glitter would be a result of glitter making one overlook important knowledge that could move us forward.[4] However, no matter the reading of danger as either troubling or productive hidden matters, I use theories on light and colour to turn glitter into a concept and conceptual lens that can help one to understand glitter's organising and governing of social behaviour, as well as to detect the many potential dangers of using glitter to organise and govern social behaviour.

In developing my new material/discursive concept of glitter, I have been further inspired by Coleman's work on glitter as something that similarly produces time, arguing that glitter indeed produces the positive gendered future times Coleman (2020) refers to, but also that glitter does more than that. As such, future times cannot exist isolated from past and present times, for they will always diffractively exist in and through future times, whereas glittery futures are also always (potentially dimmer) past, present, and alternative future times, which might affectively organise and govern other and different social behaviour than glittery future times will. Accordingly, I add new theory to the time and temporality dimension of glitter to illustrate how glitter has an unruly, uncontrollable, and unpredictable character – one already underlined by its sticky and stubborn quality. I add these theories to nuance the organising and governing effects of glitter, and to show that glitter is not just an innocent joy-maker that organises and

[4] My language editor, Susan Ryan, reminded me of the geode – a stone that looks rather grey, murky, and unappealing on the outside, but when broken open reveals a mountain landscape of intriguing, purple glitter. This excellent example provokes theories on not only how glitter hides dark dangers, but also how such 'dangers' might also hide glitter. In some 'upside-down-way' it might thus make sense to search for glitter in the dark shadows, maybe even in the dark shadows of glitter. However, I will leave this thought for further development of the glitter concept.

governs what we intend it to, as it also organises and governs what we do not intend it to. This makes glitter an unreliable instrument for organising and governing specific social behaviour, and when sprinkling glitter, one should thus be careful to avoid some of the dangers to which Pete Doherty's opening quote alludes.

In developing my new material/discursive concept of glitter, I turn glitter into a concept encapsulating a range of ambivalent tensions, arguing that glitter is both materiality/discourse; affect/cognition; light/darkness; sight/blindness; knowledge/ignorance; and past/present/future. These multiple tensions can make the concept seem messy and of little relevance to empirical research. However, the concept is not strictly intended to be directly applied to empirical data, but rather points to the importance of always searching in the dark shadows of what shimmers and shines. This new material/discursive concept of glitter is meant to remind one that, behind alluring glittery worlds other and different worlds may lie lurking in the dim darkness. Moreover, that these worlds are concealed does not forestall their having organising and governing effects and therefore operating to trouble any attempt to organise and govern.

In the following chapter, I apply my new material/discursive concept of glitter to demonstrate exactly how gendered educational STEM policy sprinkles material as well as discursive glitter on STEM. As such, this chapter should help to show how glitter can be seen as both materiality and discourse and thus as both glittery surfaces and positive affective sense-makings. In the Discussion, I will then use this concept to discuss the shadows, darkness, and dangers of glittery STEM, as well as more directly apply the many ambivalent tensions defined and described above to the findings of the thesis' three articles. However, I would first like to briefly address the possible consequences of moving away from thinking of glitter as communicating materiality and of thus giving it an extra discursive aspect. In

moving glitter away from feminised materiality, I could be asked whether I am taking gender out of glitter, whether I am working with an actual glitter concept or something with less gendered connotations? My answer would be that, since I still work with glitter as communicating materiality – and indeed the feminised materiality that Coleman (2020, 2019) describes – gender still plays a role in my new concept of glitter. I would further argue that because my focus remains on materiality, and not solely on such immateriality as shimmer, sparkle, shine, or gleam, I still operate with a concept of glitter. Nevertheless, in conceptualising glitter as being both materiality and immaterial communication, I do arguably 'queer' glitter. So, by moving glitter away from feminised materiality and towards discourse, which might allure and attract boys as much as girls, I potentially create a different form of gendered concept. However, I do not take gender out of glitter, instead bringing a new understanding of gender to glitter while also arguably adding a further tension – gendered/non-gendered – to my already multifaceted material/discursive glitter concept. As such, I underline the concept's broader relevance in a mainstream OMS context, because by queering glitter, I turn it into a concept truly relevant to the study of glitter's use in organising and governing not only the specific gendered social behaviour of girls but also all kinds of other social and political behaviour.[5] I return to this argument in the Discussion, where I discuss some of the future research in OMS that the new material/discursive glitter concept prompts.

[5] It could indeed be argued that material glitter is also queer and something that appeals to both women and men. For example, football players like Beckham and Ronaldo, who – although being defined as classic examples of the metrosexual man – are admired by boys and men around the globe, have been seen wearing glittery diamond earrings and Rolex watches (https://www.gettyimages.dk/photos/ronaldo-earrings). Moreover, glittery 'bling bling' has become a symbol of status in many Black, male hip-hop communities (e.g., https://ew.com/article/2010/10/20/kanye-west-teeth-gold-diamond/)

# CHAPTER 3
# CONTEXTUALISATION

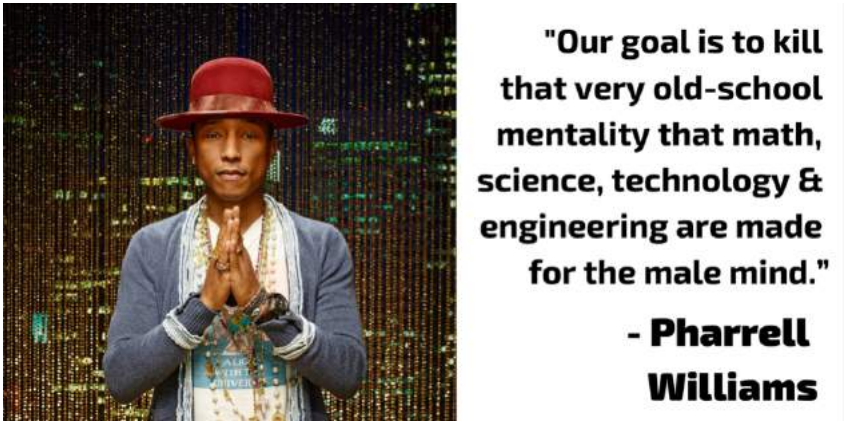
In this chapter, I apply my new material/discursive concept of glitter to demonstrate exactly how gendered educational STEM policy sprinkles material as well as discursive glitter on STEM. In so doing, I seek to show how glitter can be understood as both materiality and discourse and therefore as both glittery surfaces and positive affective sense-makings, as well as to contextualise the three articles that make up the Analysis. I return to this chapter in the Discussion, where I discuss both its arguments and those of the Analysis in relation to the Pete Doherty (2005) quote, as well as scrutinise some of the dangers possibly lurking in glittery STEM.

**3.1 The 'Glittering-up' of Policy: Sprinkling Glitter All Over! |** All gendered educational STEM policy is arguably in itself discursive glitter, because this affirmative policy communicates to girls and to the world that girls are important, needed, and appreciated in STEM. Here, however, I will detail and elaborate the discursive and the material glitter the policy sprinkles on STEM. To begin with, in the international setting of formal policy, one can see how both the OECD and UNESCO have focused on girls in STEM, investing a lot of money and resources in planning and implementing initiatives that communicate to girls that they are needed and wanted in STEM. Indeed, the OECD and UNESCO policies have arguably thrown buckets of discursive glitter all over STEM by initiating sparkly actions that both directly and indirectly communicate that becoming a girl in STEM is shiny and sensational.

These organisations' sparkly policies have communicated this notion not only to girls but also to the public, and the discursive glitter that policy has sprinkled on STEM has allured and attracted not only girls but also other individuals. For instance, an array of celebrity figures have engaged with the issue of girls' lacking STEM aspirations and women's low representation in the world of STEM. In 2013, former US president Barack Obama stated:

> One of the things that I really strongly believe in is that we need to have more girls interested in math, science, and engineering. We've got half the population that is way underrepresented in those fields and that means that we've got a whole bunch of talent[s] … not being encouraged the way they need to. (Barack Obama, The White House, 2013)

Following Obama's lead, celebrities such as three-time NBA champion Stephen Curry, Oscar-winning actor Natalie Portman, and musician Pharrell Williams, depicted below, have spread their vibrant superstar shine on the issue (Canfield & Long, 2019).




[Credit: Canfield & Long, 2019]

The many OECD and UNESCO policy initiatives have given rise to discursive glitter sprinkling as well as to more material forms of glitter, thus allowing girls – especially in non-Western worlds – to enter new and luxurious worlds of STEM education. In these worlds, girls are introduced to new, sparkly materials and

STEM equipment in such forms as gleaming technology and shiny, new teaching materials (see OECD, 2017; UNESCO, 2017, 2019).

Supplementing the international policy work of the OECD and UNESCO, the EU has run its Science It's a Girl Thing (2012) campaign, sprinkling glitter in an extremely visual – and hence more material – way, as can be seen from the video produced as a part of the campaign. The video shows three women (one Black, two White, all able-bodied) in short, glitzy dresses, and elegant stilettos, laughingly playing around with shimmering chemicals as they produce sparkly makeup products such as hot-pink lipsticks and brilliant purple nail polishes. Below, a few screenshots from the video illustrate the dazzling wealth of colours and images that the video presents.

In addition to the video, the EU launched a website that also deploys bright colours and sparkling imagery, thus visualising various facts about STEM through GIFs of flashing pink hearts and glimmery make-up graphics. Shiny tech as well as smiling women in light-reflecting sunglasses are also showcased on the website. All in all, the EU policy tossed tons of material glitter on STEM.


[Credit: https://paoloviscardi.com]

In 2018 the Danish Government spent DKK 255 million to launch two national policy initiatives, The National Science Strategy and the Technology Pact. Receiving extensive media coverage, the launches were attended by a host of VIPs, including former Minister of Trade and Industry, Brian Mikkelsen, and former Minister of Education Merete Riisager, as well as Danish celebrity and TV-star astronaut Andreas Mogensen (see Altinget, 2018). The launches thus sprinkled discursive glitter on STEM by communicating that the issues of girls' lacking STEM aspirations and women's low representation in STEM are so important that even some of the country's most prominent figures want to engage with it. However, material glitter was sprinkled too, as seen from some of the fancy venues where the initiatives were launched. For instance, the Technology Pact launch took place at Experimentarium, an award-winning, hands-on science museum in Copenhagen. The spaces are full of light-reflecting materials such as copper, aluminium, and mirrors. In the below image, the four ministers who attended the launch stand in a space replete with reflecting surfaces.

[Credit: experimentarium.dk]

Highly polished reports and policy papers (e.g., The National Science Strategy, 2018) continuously published on the two initiatives have only encrusted them with even more material glitter. Hence, national policy has supported international policy in sprinkling both discursive and material glitter on STEM, while national policy has also taken part in establishing STEM as glittery and thus alluring and attractive.

The local Danish governments that design the local gendered educational STEM policy that supports the national policy have fewer funds and resources for designing and implementing glittery policy. However, as Article 1 demonstrates, local gendered STEM policy nevertheless involves the (re)design of glittery STEM classrooms, including the instalment of flashy technology and novel, bright interiors. Thus, although formal local policy sprinkles discursive and material glitter in more moderate amounts than international and national formal policy, it still manages to participate in constituting STEM as glittery.

Turning to international commercial and market-driven gendered educational STEM policy, I would like to mention Microsoft's #MakeWhatsNext campaign, which includes two videos that flash a range of images from shimmering labs where a group of neatly dressed young girls use innovative tech, such as AI tools, to enter a dreamy world of twinkling blues and radiance (see Microsoft, 2016a, 2016b). The videos use material glitter in the form of glimmery, colourful images, as seen in the below screenshots, which are from one of the Microsoft videos (Microsoft, 2016b). The images depict the girls entering a STEM world aglow with stars and shiny, icy landscapes.


Like the policy enacted by Microsoft, the one enacted by Google similarly makes use of material glitter. Its policy includes the establishment of an extravagant, colourful STEM lab – 3,900 square-feet of shiny technology to help girls explore and play with STEM (Fustich, 2018). The space is in Google's New York City headquarters, located at a 'very-money-address' in the trendy Chelsea neighbourhood on Manhattan's West Side. As such, the policy sprinkles not only material but also discursive glitter in communicating the connections between girls in STEM and a place associated with money, success, fashionable people, and high-class lifestyles.

[Images from inside the Google NYC HQ lab. Credit: archdaily.com]

Assisting Microsoft's and Google's policy in sprinkling glitter on STEM, the toymaker Mattel has included material glitter in its large production of various STEM Barbies, including STEM Kit Barbie, Robotics Engineer Barbie, Astrophysicist Barbie, and Vaccine Developer Barbie. For instance, Mattel's STEM Barbies wear jeans with gleaming gold threads, shimmering makeup, and light-reflecting safety glasses, and, of course, they have Barbie's trademark shiny, long, light-attracting and -reflecting plastic hair. Computer Engineer Barbie even has a silvery bag and a pink computer with bits of glitter inside. The Barbies pictured below are among the wide selection of glittery STEM Barbies that Mattel has produced to let girls imagine themselves as part of the STEM field through play with material glitter.


You*niverse and Playz also produce international commercial and market-driven policies – in the form of educational STEM toys – that use material glitter. You*niverse (n/d) has developed the Sparkling Perfume Lab, a pink science kit for

preschool girls that allows them to explore STEM activities by mixing glitzy perfumes in a variety of colours. Similarly, Playz (n/d) has designed the purple Unicorn Science Kit, which gives girls the opportunity to create 'glow in the dark slimes and crystals' and thus get involved with gleaming STEM activities. As such, the two colourful toy sets are explicitly designed to make girls engage with material glitter as they seek to form their STEM aspirations.



Another national commercial and market-driven gendered educational STEM policy worth mentioning is Girls' Day in Science (2021), an initiative that gives girls the opportunity to spend a full day at some of the gleaming headquarters of the (inter)national STEM companies located in Denmark. The initiative gives girls exclusive access to the often impressive headquarter buildings, and most of the companies also treat the girls to a fancy breakfast and nice lunches. In this way, the initiative sprinkles discursive glitter on STEM by giving girls a large amount of undivided attention and thus communicating to them that they are important

and valued. Further, the initiative sprinkles material forms of glitter by offering girls a day in flashy buildings and pampering them with breakfast and lunch.

Finally, the national commercial and market-driven gendered educational STEM policy designed by LIFE has led to the development of impressive mobile labs that travel between Danish primary schools (LIFE n/d, a). The policy has further resulted in the building of a large crystal-like science centre surrounded by big glittery, mirror pillars that literally attract and reflect light – materially, but also discursively, as the pillars are part of an art installation by world-famous Danish artist Jeppe Hein, whose discursive artistry is thus beamed onto STEM (LIFE, n/d, c). Located in a natural setting on the outskirts of Copenhagen, LIFE's science centre offers specially designed STEM courses against a backdrop of brand-new interiors, innovative tech, and glossy teaching materials. As such, the policy sprinkles material glitter on STEM by allowing girls to enter and engage with material glitter manifested in the shiny labs and architecture. However, discursive glitter is sprinkled alongside the material glitter. LIFE is headed by former Danish Minister of Education Christine Antorini, who has actively been communicating the agenda of bringing more girls into STEM (LIFE n/d, b). For instance, in an essay published in a local Danish newspaper, Antorini expresses the importance of parents' removing their 'gender-glasses' and exploring STEM activities with their daughters, because those girls are urgently needed to engage with STEM and develop solutions to the formidable societal challenges we face today (LIFE, n/d, b). As such, Antorini, like the above celebrities, uses communication to spread some of her star quality on STEM, while the gendered educational STEM policy of LIFE also sprinkles both material and discursive glitter on the field. Below are some images of the visually stunning buildings, facilities, and activities that LIFE offers.


[Credit: LIFE.dk]

As this chapter has shown, gendered educational STEM policy sprinkles material/discursive glitter on STEM. In so doing, the policy also constitutes STEM as glittery and shimmering and thus as something that would allure and attract girls and thus help foster STEM aspirations in them. However, as argued above,

sprinkling glitter to allure, organise, and govern social behaviour is a perilous undertaking, for which reason gendered educational STEM policy runs the risk of producing an unruly and uncontrollable governance along with blindness and ignorance. In the Discussion, I return to this argument to discuss the findings of the thesis' three articles in relation to some of the many dangers of glitter to which the Pete Doherty (2005) quote alludes.

# CHAPTER 4
# METHODOLOGY

In this chapter, I detail the methodology of the thesis. I first introduce my specific ethico-onto-epistem-ological position, then describe the theoretical journey that led me to combine the specific theories I engage with – a description in which I also briefly reflect on how they complement and challenge each other. Having mapped this journey, I present the specific facet methodology guiding my choice of methods and data generation, as well as the specific methods used to generate and code data on affect and time. I end the chapter by commenting on my positionality, the non-comparative character of my study, and the challenges posed by COVID-19.

**4.1 Ethico-onto-epistem-ology |** As previously stated, I subscribe to the same foundational queer understandings of the world as Barad does (1996, 2007, 2013, 2017), and the theoretical STEM universe Barad represents similarly underlies my understanding of how the world emerges and exists. In this STEM universe, the world is explained as resulting from the intra-actions of a range of (im)material actors that, collectively, constitute one large entanglement (Barad, 1996, 2007). Barad (2007) thus refers to the concept of *time-space-matter*, illustrating how the world emerges and exists in and through the intra-actions of actors as varied as social practices *and* time, space, and matter (materiality) (e.g., p. 74). All these actors play equally important acting roles, for which reason one cannot differentiate or hierarchise between them when attempting to analyse and understand the world as it emerges and exists.

In agitating for an entangled world that consists of materiality in addition to non-materiality, Barad (1996, 2007) positions themself within a broader and fairly new tradition of *new materialism* (e.g., Haraway, 1988; Coole & Frost, 2010; Dolphijn & Van der Tuin, 2013; Braidotti, 2000, 2002). New materialism ascribes equal agency to the social and the material, thus pointing to the necessity of analysing materiality as well as discourse when one seeks to analyse and understand the

world. Accordingly, this thesis also operates within the new materialism tradition when I argue that the materiality of the body, the materiality/discursivity of glitter, and (im)material time – for instance, the temporal materiality of glitter and the temporal discourse of aspiration-raising policy in the form of gendered educational STEM policy – organise and govern the social behaviour of girls.

Since the world exists as one large entanglement, Barad (1996, 2007) states, the researcher of the world is doomed to be a part of the world she studies, and therefore cannot differentiate or hierarchise ontology and epistemology (Barad, 1996, 2007). The world emerges and exists because of how we researchers are present in it and hence because of our (theoretical) intra-actions with it. Since the researcher cannot differentiate or hierarchise between ontology and epistemology, Barad (2007) calls for a new *onto-epistem-ology* (p. 185), which is a position recognising that *ontology* and *epistemology* are equal.

Barad (2007) defines onto-epistem-ology as the 'study of practices of knowing in being' (p. 185). Hence, it is a type of study that requires the researcher to critically consider how she – in and through (theoretical) intra-actions with the world that she studies – shapes that world. As such, onto-epistem-ology also involves the inclusion of the researcher's explicit ethical reflections on choices, selections, and actions in her research. In fact, Barad (2007) contends that it might make even more sense to operate with an *ethico-onto-epistem-ology* (p. 185), which, like onto-epistem-ology, recognises that one cannot differentiate between ontology and epistemology, but also involves an 'appreciation of the intertwining ethics, knowing, and being' (p. 185). In this thesis, I take an ethico-onto-epistem-ological position, while I also pay close attention to the implications and effects of me – and my (theoretical) actions – being part of and shaping the very world I am studying.

When it comes to defining what obtaining an ethico-onto-epistem-ological position entails, Barad (2007) states that to study the world, the researcher must construct an *apparatus* through which she can observe, analyse, and understand the world. 'Apparatus' is basically Barad's STEM-related term for methodology, therefore covering the different theories, methods, practices, but also the embodied knowledge, the researcher combines when seeking to examine the world (Barad, 2007). Although, the term has associations with objective science, this is not what the researcher's apparatus enables. Rather, it performs a range of *agential cuts* that limit the world in a way that allows the researcher to observe, analyse, and understand it in a very particular way. The cuts are described as agential because they are neither innocent nor passive; one set of cuts limits the world so that it appears one certain way, while another set limits the world so that it emerges in an certain other way (Barad, 2007, p. 148). In other words, the agential cuts performed by the apparatus act to narrow the research field to a degree that enables the researcher to observe and thus understand some small part of the vast entanglement that makes up the greater world.

In pursuit of my interest in the world of glittery STEM, I have constructed my apparatus to perform agential cuts that allow me to observe and understand a very particular world, and explicitly the role that gendered educational STEM policy plays in organising and governing girls' STEM aspirations in that world. As such, my research question(s) and the wonders and curiosities they imply have guided the construction of my apparatus, the first parts of which I described through my choice of theories in the Theoretical Framework, and the remainder of which I outline in the following. Before embarking on this endeavour, however, I first review the theories comprising the Theoretical Framework. Accordingly, I map the theoretical journey into the glittery world of STEM that has led me to combine – and make agential cuts in and around – the specific theories on affect and time.

**4.2 My Theoretical Journey |** I first encountered the EU campaign Science It's a Girl Thing (2012) as a student attending Suki Ali's course on gender and society at the London School of Economics (LSE) in 2014. The campaign video stayed forever with me because it so clearly shows how policy (re)produces stereotypes in the educational system and thus a gender-segregated labour market, but I was also quite simply allured by its magical use of shimmer and shine. Everything in the video – the light, the colours, the music – is radiant. Thus, as one can see, my very first encounter with the world of STEM was full of glitter, and in retrospect glitter is also what drew me to propose a PhD project on girls in STEM. Although, unaware of this at the time, I was drawn to the world of STEM because of all its glimmering (inter)national policy initiatives, the gleaming STEM toys, the events in shiny headquarters, and the sparkly academic talks at high-ranked educational institutions. I will return to how I got stuck on glitter – or how it got stuck on me – later. For now, I would like to sketch my theoretical journey into the glittery world of STEM chronologically, my aim being to pinpoint the specific connections I have made across readings, theories, and disciplines. However, let me first acknowledge that glitter seemed destined to enter the project and bind it together, as its principle motivation was and remains glitter.

A theoretical interest in affect and the organising and governing role it played in forming social behaviour sparked the project. Having already worked with Ahmed's theories on affect and explored the many potentials of her work, for this project I wanted to delve into other forms of affect theory. When designing my project, I therefore thought I would be pulled towards the affect scholars belonging to the first school of affect theory presented in the Theoretical Framework, but Ahmed and I crossed paths again, intersecting in various ways that in retrospect make good sense for a variety of reasons.

First, being focused on power and subject formation, Ahmed's (2004a, 2004b, 2010, 2006) queer feminist theories are in many ways aligned with Foucault's (1990, 1991, 2010, 2009) central concept of governmentality. This focal similarity means the two scholars' theories can quite easily and in fact productively be converged, despite their diverging emphases on affect and discourse as the primary, respective matters that produce power and thus organise and govern social behaviour.

Next, when it comes to a study of aspiration formation anchored in theories on aspiration-raising policy, Ahmed's theories – especially on discursive narratives as investing affects in objects – seem very useful for explaining how an affective governmentality plays out in such formation. Theories on aspiration-raising policy – more or less – contend that such policy operates by investing a 'promise of happiness' (Ahmed, 2010, p. 30) in the object of a future of education, thereby apparently also following Ahmed's argument that subjects adopt and abandon specific life choices based on the positive or negative affective meaning invested in the objects of these choices (e.g., Sellar, 2015; Sellar & Storan, 2013; see also Article 1).

Although combining Foucault's and Ahmed's theories has its upsides in the analysis of aspiration-raising policy, one can indeed also critically argue that by 'reducing' Foucault's theories to 'fit' Ahmed's theories, my constructed apparatus performs an agential cut that partly prevents me from focusing on the organising and governing of social behaviour at the subject level, which Foucault's theories would otherwise allow. For instance, Foucault's (1982, 1990) dimension of agency in the sense of possible resistance is arguably absent in Ahmed's (2010) work. In her work, the subject must be destined to adopt and abandon certain social behaviour, if the organising and governing of social behaviour involves no direct cognitive reflection and thus entails behaviour motivated in the instant a

subject encounters an affectively invested or surfaced object. As such, important elements of Foucault's theories – elements of potential relevance to this thesis' findings – become lost when combined with Ahmed's theories. In Article 3 the girls explain how not only affects but also careful considerations organise and govern their social behaviour, which indicates that affective conditions are something girls cognitively negotiate. Indeed, by avoiding negative and pursuing positive affect or accepting that something is either positive or negative, the girls actively consider whether, for instance, negative affect will become worthwhile positive affect in the long run, thereby making educational choices on this basis. In this light, a new concept of affective governmentality combining Foucault's and Ahmed's theories emerges as highly relevant for analysing the affective and temporal organising and governing attempts and effects of aspiration-raising policy, despite the concept is carrying some apparent limitations if used to explain affective governmentality on a subject level.

Although the new affective governmentality seemingly allowed me to understand the affective governmentality performed by aspiration-raising policy in the form of gendered educational STEM policy, I felt something was still lacking after this concept emerged. My initial observation data held none of the glitter that had allured me to study the world of STEM, and nothing – neither Foucault, Ahmed, nor the literature on aspiration-raising policy – pointed me towards any glitz and glow. I found that missing link, that sparkle and twinkle, when introduced to Coleman's book *Glitterworlds – the future politics of a ubiquitous world* (2020). These theories indicated the organising and governing allurement of STEM, while also allowing me to partly rethink theories on affective governmentality and thus the glittery, organising, and governing operations of gendered educational STEM policies.

However, in thinking of affective governmentality as glitter, one makes an agential cut that opens a line of sight to the shimmer and glimmer of Barbies, shiny headquarters, and innovative labs, but obscures, for instance, the regular teacher in ordinary, un-glittery outfits. I had noticed such a teacher in my data for Article 1, realising his potential relevance to a study of the affective governmentality enacted in the STEM classroom. This article indicates that the teacher and his un-glittery actions played an organising and governing role in forming the STEM aspirations of girls in his classroom because the lacklustre naturally also evokes affects (Ashworth, 2017).

The use of glitter to analyse the operations and intended affective governmentality of gendered educational STEM policy leads to another agential cut. This cut allows one to focus on glitter as generally producing positive rather than negative affects, as well as opens up analyses of positive affects and closes down analyses of negative affects. According to Coleman (2020), however, glitter produces not only positive but also negative affects, such as irritation and frustration. Thus, I could have recognised and explored glitter as an element of an affective governmentality other than the one my interest in the intended effects of gendered educational STEM policy spurred me to identify.

Constructing an apparatus whose agential cuts serve to constrict Foucault's theories to 'fit' those of Ahmed, to narrow affective governmentality to glitter, and to limit glitter to positive affect thus enables me to see and examine a very certain glittery world that is only a very particular part of the total entanglement that makes up the greater world. As such, my choice of theories does nothing to assist me in pinning down *the* answer to questions about how gendered educational STEM policy organises and governs girls' STEM aspirations and what this organising and governing might imply. Instead, it allows me to present *an* answer to these questions.

In sum, my theoretical journey into the world of glittery STEM ended where it started, namely with glitter. However, between my point of departure on glitter and the terminus, I went from theories on aspiration-raising policy, to theories on affective governmentality, to theories on time and temporality. These theories certainly explain the world through different foci and lenses, but they still appear to come together in glitter as a governing element of affective governmentality. Accordingly, my theoretical 'wandering abouts' – or maybe actually '*wondering* abouts' – also appear to neatly settle into one concept: my new material/discursive concept of glitter.

This does not mean that other, more precisely plotted journeys could not have been made. Indeed, allowing myself to be guided by my wonders and constant new findings and insights, has ultimately led me into a transdisciplinary – partly postdisciplinary (Munar et al., 2018) – space, a place where I play across theories and disciplines rather than profess to a singular theory or discipline. My theoretical point of departure was in the affective governmentality encouraged in OMS, but my problem field lay in education studies, which I then came to read through the glitter I discovered in cultural studies and am now attempting to bring into OMS by indicating the organising and governing effects of glitter. Still, although I had no neatly plotted map to guide me – and a highly demanding, rather troublesome travel companion called COVID-19 – it all seems logical on reflection. What is more, this journey has culminated in a group of both theoretical and empirical contributions that I feel confident can advance the fields of both OMS and education studies.

**4.3 Facet Methodology |** My apparatus has made agential cuts in method as well as theory. In this section, I detail my choice of methods, which have shaped the glittery world of STEM I have come to study as impactfully as the above theories. I continue to allow myself to be guided by Barad's (1996, 2007)

argument that the world exists on the basis of multiple actors' intra-actions, for which reason it must also be analysed from various angles and perspectives. Consequently, my inspiration for data generation springs from Mason's (2012) *facet methodology*, which, like Barad's (1996, 2007, 2013, 2017) STEM-related theories, speaks fittingly to the focus of the thesis. Mason (2012) contends that research fields should essentially be understood as glitter, arguing that research fields can be seen as 'constructed through combinations and constellations of *facets* as we might see in a cut gemstone, where facets refract and intensify light, taking up the background, and creating flashes of depth and colour as well as patches of shadow' (p. 75, original emphasis).

Approaching a research field as a glittery gemstone requires the researcher to conduct her research in a very particular way, as her role becomes to shed a multiplicity of light on the gemstone and thus illuminate the stone's manifold facets and surfaces. As such, the researcher's role is to illuminate enough facets of the glittery gemstone to attain an overall, nuanced idea of how the general stone itself looks. Transposing the glittery gemstone analogy into clearer method language, Mason (2012) contends that the researcher is tasked with combining different methods to ensure a diversity of data on a specific research field and thus to provide a more detailed and multidimensional representation of that field.

As stated, this approach recognises the world as complex and is therefore aligned with Barad's (1996, 2007) theories. Still, one can nevertheless critically claim that in subscribing to such an approach, one risks superficially analysing a great deal at the expense of a narrower, in-depth analysis of something less. Conversely, however, one could argue that in conducting a narrower, in-depth analysis of something less, one risks ignoring the complexity of the intra-acting entanglement of which that something is solely part. Thus, both approaches have strengths and weaknesses, and one must choose the approach best suited to the study concerned.

Wanting the most nuanced analyses possible for my study, I therefore decided to design my data generation in line with Barad's (1996, 2007) theories. As such, I could have focused more strongly on the girls' experiences but opted instead to bring nuancing perspectives from both the glittery world of STEM, gendered educational STEM policy, and the affective and temporal STEM world experienced by girls.

In the following, I elaborate on the different methods I have applied to illuminate the multi-facets of how gendered educational STEM policy organises and governs girls' STEM aspirations and the implications of this. First, I present how I have generated macro data on the policy level to gain insights into the affects and times policy attempts to produce – and produces and organises – by sprinkling glitter. Second, I outline the different methods I have used to generate micro data at the level of the girls, thus gaining insights into how they experience as well as affectively and temporally relate to glittery STEM.

All the methods introduced and used in this thesis are qualitative, which I again ascribe to my Barad-inspired research position. From this position, I am able to trust that the world emerges and exists on the basis of how we subjectively intra-act with it and thus that objective or general 'truths' about the world are unattainable. Accordingly, my interest diverges from quantifiable and generalisable data that can bring one closer to the (non-existing) 'truth', as I must accept that my entanglement with the world I study, will compel me to constitute the organising and governing attempts, operations, and effects of gendered educational STEM policy in a certain way, and that I will have to rely on girls' temporal and affective experiences with STEM as valid experiences despite their being highly unique and subjective.

**4.3.1 Netnography |** As the glitter sprinkled by policy is what frames this thesis, I start by introducing how I have generated and coded data on glitter-sprinkling policy. Some of the data on gendered educational STEM policy presented in the Introduction, the Contextualisation, and the Analysis (Articles 1 and 2) were generated as part of my initial research on girls in STEM at the outset of my thesis work. Thus, I had already encountered some glitter sprinkling policy when the pandemic hit and forced me to strengthen my focus on policy practices available online, rather than teaching practices from (closed) schools. However, this data could only give me an overview of the many gendered educational STEM policies, so I conducted more structured searches on the policy in order to better understand this field.

These searches were inspired by Kozinets' (2002) definition of *netnography* and netnographic work. Obviously, policy fields are not directly shaped like the forums or online communities that Kozinets (2002) refers to in defining netnography and what it studies. However, policy fields arguably still comprise specific online fields, including blogposts, images, videos, games, and reports with a common focus, for instance, on girls in STEM, while also operating within a specific 'culture' that cultivates certain takes on gender, education, and society.

A first step of Kozinets' (2002) netnography involves defining a group of questions that can guide one's searches. As I started my nethnography work with an already established group of research question(s) concerning how gendered educational STEM policy organises and governs girls' STEM aspirations with a focus on affect and time, I could move directly to the next step and start defining the field within which investigating the questions was relevant for me (Kozinets, 2002, p. 63).

As stated in the Introduction, I am inspired by the work of Shore and Wright (2011), while I do not see policy as enacted solely by formal policy actors, but rather also by a range of commercial and market-driven actors. As such, the relevant policy field for me to investigate was defined broadly. For data on formal policy, I started with the EU (2012) campaign Science It's Girl Thing, which in many ways has paved my way into gendered educational STEM policy and, through cross readings, led to further international policy made by bodies such as the OECD and UNESCO. This policy also directed me to national policies aimed at supporting the international policy, which in turn led me to local policies that supported the national ones. For commercial and market-driven policy, my search commenced with the private foundation LIFE, with which I had planned to collaborate before the pandemic struck. This search took me to Microsoft and Google, two private companies that in many ways enact the same type of policy as LIFE. These companies then took me further into the commercial and market-driven field of policy, where, for instance, I came across the toymaker Mattel, a range of STEM Barbies, and glittery STEM kits.

I limited the wide-ranging policy field of gendered STEM policy, ultimately defining it by spotlighting policy I trusted would resonate with a relevant international or national audience. I exempted local policy from this criterion, as such policy is usually only known by people in the municipality where it is implemented. As such, I was guided by a criterion of needing to have previously heard about the policy or the actor behind it, either in the media or in conversations with colleagues, corporate actors, friends, family, and/or teachers. Hence, my rationale in defining the field lay in the field having to be one that people engaged with and thus one that could influence girls and their social behaviour.

My research question(s) meant that I was interested in analysing how the field produced affect and time. Having theorised glitter as producing both, I condensed my reading concerning affect and time to discursive/material glitter in the documents on gendered educational STEM policy I ended up with. I decided to code the documents through a *document analysis*, which, according to Bowen (2009), is an analysis that concentrates on images and discursive content, while also being a method useful in analysing both material and discursive glitter. To begin the analysis, I skimmed documents and noted passages of apparent pertinence (Corbin & Strauss, 2008). I took this first step by primarily focusing on material glitter and initially leaving discursive glitter as a secondary focus, because the data, being affirmative policy aimed to foster STEM aspirations in girls, was obviously already discursive glitter in itself. The next and last step of the document analysis involved tracing patterns between the immediate noted passages to see how they related (Fereday & Muir-Cochrane, 2006). Their relation proved to lie in their focus on designing various affirmative educational events and training courses; their activation of shiny technology in education and educational activities; and their indication of situations involving visits to sparkly headquarters, attention from glitzy celebrities, and toys infused with glitter. As such, all gendered educational STEM policies sprinkled discursive glitter on STEM in the sense of being affirmative gendered policy, but some also explicitly sprinkled discursive glitter in the sense of designing and recommending educational activities, even as they sprinkled material glitter. I have presented the policies explicitly sprinkling discursive/material glitter in the Introduction and in the Contextualisation.

Having introduced how I generated and analysed the macro data I have used to examine how gendered educational STEM policy produces – or intends to produce – specific affects and times by sprinkling glitter, I will now introduce the methods

applied to generate and analyse micro data on girls' affective and temporal experiences with and relations to glittery STEM. In the following section, I therefore present the partner school where I generated my data and then detail the methods.

**4.3.2 The Partner School |** My partner school is a Danish public co-educational primary school located in a municipality that introduced a STEM policy for all their schools in 2017. The policy targets all children, but the municipality – including my partner school – specifically focuses on girls and on motivating more of them to enter STEM education. As a result, when I arrived at the school in the late summer of 2019, it had already been obligated to implement a gendered educational STEM policy for more than two years, and had thus begun the process of becoming an actual STEM-profiled school specialising in STEM education.

Being based in an area of northern Zealand known for having an upper-middle class, high-income demographic, the school has a student population primarily made up of children financially able to bring expensive educational technology to school. Moreover, bringing in higher tax revenues, the municipality generally has larger budgets for improving (STEM) teaching than most other Danish schools do.

Considered among Denmark's best according to a range of available indicators, the school scores high on the national wellbeing index [*Trivlsesmåling*], which is used to measure students' social wellbeing in Danish schools. The students' grades are also well above the national average. The students are mainly White, and the few students with ethnic backgrounds other than Danish are generally from Asian expat families living in the area because of employment at one among several large medical or technology companies based in the municipality.

Because the school mainly has ethnically Danish students from highly affluent families, it is not representative of Danish schools in general. However, I still chose to work with the school, as I wanted to generate rich, detailed, and in-depth data on future-oriented, gendered STEM education, and with its location and class characteristics, the school has provided exemplary access to such data. Nevertheless, my decision to work with this specific partner school has forestalled me from making any analytical statements regarding class, income diversity, and ethnicity.

At the school, I worked with girls from two separate classes, one a 6th grade class (12-14 years) and the other a 7th grade class (13-15 years), which respectively became 7th and 8th grade classes as the project progressed. In Denmark, students in grade 6 and below receive STEM education in nature/technology, a single subject that covers geography, biology, and physics/chemistry (mathematics is taught separately). From grade 7, students start taking differentiated STEM subjects, including biology and physics/chemistry which they learn in classrooms specifically designed for these subjects. Hence, by studying 6th and 7th grade girls, I sought to acquire more nuanced insights into experiences with STEM education than a sole focus on girls at the same grade levels would have provided.

In the following, I explicate the methods I used to generate data on affect and time in my partner school, and thus the data generated to answer the thesis' research question(s).

**4.3.3 Observations |** I carried out observations (Deatrick & Faux, 1991) in the school over a period of approximately a year, or roughly 3 months of 'full-time' observations. I observed only STEM classes, but then all STEM classes. As such, for grade 7, I attended one weekly double lesson in biology, one weekly double lesson in physics/chemistry, one weekly double lesson in geography, and two

weekly double lessons in mathematics. Grade 6 receives less teaching, and the STEM classes are merged, so the students have fewer lesson hours. I started out observing grade 6 in nature/technology and mathematics, and grade 7 in physics/chemistry, geography, biology, and mathematics.

As the STEM setting was new to me, I initially selected my observation studies with a view to gaining insight into the general practices of a STEM classroom. However, as my observations progressed, I realised that they gave me insights into not only general educational practices but also the girls' affects. I could observe, for example, shaking voices, blushing faces, laughs, singing, smiles, little dance moves, high-fives, and so on. This also gave me access to the type of affect that presents itself through visible bodily reactions (see Bjerg & Staunæs, 2011). Thus, although my observations plainly could not enable me to feel or sense what happened inside the girls' bodies, they still helped me understand some of the affective states that occupied these bodies.

With this finding in hand, I decided to use observation studies for insights into not only the general practices of the STEM classroom, but also the affects my study aimed to examine. Thus, approximately a month into my observation study, I designed an observation guide intended to ensure a specific focus on the girls' visual bodily reactions and behaviour during teaching. For instance, the guide prompted me to focus on how girls bodily reacted to STEM teaching activities, to their STEM teachers, to their STEM teaching materials, to each other, and to the materiality of the STEM classrooms.

To capture how girls affectively related to time, I further developed my observation guide to focus more explicitly on the materiality of the STEM classroom. I was interested in this materiality and how it might reveal that future as well as times other than the future ones were present in the classroom. As such,

I was interested in how girls related to the (im)material times found in the STEM classroom.

I made my observations during class, jotting them down in a physical notebook. However, at each break I typed up my handwritten notes with additional analytical comments to ensure that I had detailed notes made close to the actual observations, and that the data included any nuances I was unable to elaborate on during the classes. I was inspired by the work of Emerson, et al. (2011), who point out the importance of the ethnographer's carefully noticing and remembering dialogues and movements, as well as colours, shapes, moods, and rhythms to ensure fieldnotes as close to the educational practice as possible.

**4.3.4 Photo-elicitation |** Because productions of affect are one focus of this thesis, I supplemented the observation study with a photo-elicitation exercise (Ravn & Demant, 2017; Kofoed & Staunæs, 2014; Staunæs, 1998). According to Coffey (2019), this exercise enables girls to capture 'embodied sensations and "felt" dimensions' (p. 1) and arguably also serves as a tool that helps them communicate their affective experiences with STEM education. As such, I intended for the exercise to help me nuance my observations of girls' bodily reactions as I could get their own perspectives on the affect I had interpretated on their behalf.

The photo-elicitation exercise was done with the girls in grade 8 (grade 7 during observations) and took place over the course of one full school week (5 days). In the morning of the first day, I visited the school and introduced the exercise to the girls. They were instructed to use their smartphones[6] to take three photos a day during this one week, and were told that the photos had to be of exercises,

[6] Note how it was not a problem that the girls had to use a smartphone to take their photos. All girls had a phone at their disposal. Obviously, this is not the case for girls in all schools, while the demographics of the school meant a lot for how this exercise could be and was planned and conducted.

practices, and situations in STEM teaching that made them feel either good or bad. However, if something happened in other subjects or at home, and they found this important to share with me, they could also take photos outside of STEM teaching. They were further told not to take any photos with visible faces or other identifiable characteristics, and that they had to ask for consent before taking photos of others and to refrain from taking any compromising photos.

In addition to these verbal instructions, the girls were given a poster they could hang in their main classroom to remind themselves to take the three photos of STEM teaching every day. Their main teacher also put an image of the poster on the school's intranet, where the girls could digitally access it. Last, the girls were shown a short video on how to upload their photos to a personal online folder on a daily basis, so that I (and only I) could securely access them.

The exercise resulted in a total of 116 photos, most of which far from conveyed a glittery STEM world. Moreover, many of the photos seemed utterly unrelated to affectivity or STEM teaching. In fact, quite a few of the girls' photos appeared rather random – for instance, a screenshot of a digital football and a photo of a pair of black Converse shoes, taken from a bird's eye view. When I did come across photos that immediately struck me as offering exciting affective insights, the girls had often forgotten why they had taken them, or the reason for taking the photo was simplistic.

For instance, I had high hopes that the girls that took the two upcoming photos would share important information about the many affects they had attempted to capture with the photos, but these hopes were dashed when the girls told me that the photos were simply meant to illustrate how their biology lesson had been done outdoors to help prevent the spread of COVID-19. Nothing more, nothing less. Even when I tried to get the girls to explain and detail the affects and thoughts that

had made them take those exact photos at those exact moments, the confused girls merely said being taught biology outdoors was fun – but then so was being taught it indoors. As such, the girls were not always terribly reflective about their photos, though one could assume that their lovely photos were taken for some (affective) reason, even if the girls were unable to fully articulate why they were drawn to these motifs.

Thus, I was not immediately able to read the photos in the kind of detail that, for instance, Coffey (2020) could from the photos a group of young people took during a photo-elicitation exercise to describe their affective wellbeing. These photos beautifully capture aesthetics and atmospheres that visibly point to very specific readings of how nature has helped these young people to release negative affect. The girls in my study could have taken more random photos than the participants in Coffey's (2020) study for many reasons, but the girls' young age could well be one, as participants in Coffey's (2020) study were almost adults. Their older age meant they had lived through more challenging life phases that

had forced them to reflect on their affective wellbeing and how to improve it. Thus, the age and reflection level of Coffey's (2020) participants would make them more capable of planning and staging relevant photos of affective conditions than the girls in my study were.

I describe the photo-elicitation exercise in more detail, including the difficulties of capturing affect through photo-elicitation – at least when working with young people – in Article 3, but will leave this discussion for now. However, below I have attached a few photos taken by the girls, as I would like to share how going through their photos left me with this sense of randomness, but also surprising (and, to be shamefully honest, disappointing) visuals of dirt and muddy gloom rather than glamourous glitter. Although different girls took each of these photos, except for the screenshotted digital football and photo of black Converse shoes, similar photos could be found in all the girls' albums and are thus representative of the photos the girls shared with me.

**4.3.5 Qualitative Interviews |** I followed up the photo-elicitation exercise with semi-structured qualitative interviews (Brinkman & Kvale, 2018), during which the girls could elaborate on the affects they had attempted to capture with the photos. Hence, combined with the photo-elicitation exercise, the interviews were meant to give insight into the productions of affect studied in this thesis. The girls took photos for one week and were then individually interviewed about them the next week. To structure the interviews, I used an interview guide covering topics on bodily reactions and affect as well as topics like past experiences and future dreams and aspirations, all for the purpose of enabling me to establish potential connections between productions of affect and time.

Inspired by the feminist approaches of Fraser and Taylor (2020), I was aware that to get the girls to communicate about affective experiences, I would have not only to ask questions related to affect but also to create an affective setting where girls trusted that their affective experiences – positive as well as negative – could be safely shared with me. Thus, at the interviews, I made sure to be very open, listen carefully, and show a genuine interest in what the girls were trying to tell me (see also Minikel-Lacocque, 2019). As such, my interviewing required what Fraser and Taylor (2020) call a 'use of self' (p. 9), and thus not only that girls shared affect but also that I showed affection.

In total I interviewed 11 girls on the basis of each their unique batch of photos. 12 had taken photos, but one girl was unable to participate in the interviews, so her five photos were omitted. The interviews generally lasted around 30 minutes, but some interviews were shorter, the shortest being 12 minutes. This was because some girls had taken few photos to discuss in an interview, but possibly also because the pandemic prevented the girls and me from establishing relationships of trust. Almost a year passed from the girls' first encounter with me as an observer in their classroom to the time of the interviews. When I returned to the

girls' class after the first lockdown some students even asked me whether I was a substitute for their teacher, who was ill with COVID-19. Naturally, pandemic times would lead students to this assumption, but the episode also demonstrates how when I recommenced my studies, I had become a stranger to many of the girls.

The lack of some girls' trust manifested itself in a range of sceptical questions about my intentions with the interviews. For instance, I was asked where the interviews would be published, who would be able to read them (maybe teachers), and whether their names would be changed. Despite this initial scepticism, however, most girls seemed pleased to share their experiences with STEM teaching.

All interviews were conducted in Danish and were transcribed verbatim, and those parts of the interviews to be used in text were then translated into English.

**4.4 Data Analysis |** Having already demonstrated how I coded my macro data on policy through a document analysis, in this section I explain how I have coded the micro data generated with the three respective methods of observation studies, photo-elicitation, and qualitative interviews. The practice of coding data can be criticised for reinforcing hierarchies and excluding anything that cannot be captured in discursive categories (MacLure, 2013a). Like Barad (1996, 2007) and their theory about the researcher as someone that constitutes the world, she studies by studying it through a specific constructed apparatus, MacLure (2013a) argues that coding is a matter of the researcher limiting and fixing things within specific discursive categories. MacLure (2013a) states that coding is a process of mapping recuring patterns in a way that excludes important substances, because coding, for instance, 'does not recognise changing speeds and intensity of relation, or multiple and mobile liaisons amongst entities' (p. 169).

In arguing that coding is a discursively excluding and hierarchising practice, MacLure (2013a) maintains that data can be categorised by other means than language and discursive categories. She states that affect and bodily intensities could also determine what the researcher emphasises in her coding. The way she feels and the wonders produced when she comes across a specific datum could be what alerts her to the relevance of exploring such data further.

When arguing in favour of coding data through affect and wonder, MacLure (2013b) talks about the 'The Wonder of Data' (p. 228), which entails a form of data that glows – or glitters – in the sense of grabbing the researcher's attention by virtue of its shine and radiation (see also MacLure, 2013c). Glowy data 'shades into curiosity, horror, fascination, disgust, and monstrosity' (MacLure, 2013b, p. 128), thus somehow also becoming entangled with the researcher through an affective connection (see Barad's [1996, 2007] theories).

I was indeed allured to study the world of glittery STEM precisely because it was shimmery and evoked wonders. As such, when I encountered glittery STEM, the data I fell upon – or was affectively attracted to and thus entangled with – glowed. In my coding of data, I have further been guided by the horror evoked in me when the policy data proved to harbour pink and sexist stereotypes, by my bewilderment with some of the girls' photos, and not least by the curiosity and disgust that welled up in me when I saw the dead and dusty animals introduced in Article 2. In this article, my co-author and I fully develop a method for 'travelling' into the data that affectively calls for an explorative unfolding, for which reason, for now, I will thus focus on the language and discursive categories I used to code my data along with affective evocations, wonders, and glow.

The data used and analysed in Articles 1 and 3 have been coded through a qualitative content analysis (Mayring, 2000; Stemler, 2000), since I, qua my

research question(s), specifically wanted to understand what content of affects and times – and experiences of and with affects and times – could be read from my data. As such, the thesis research question(s) also guided the qualitative content analysis and my data coding.

I made analytical notes during my observation study, the photo-elicitation exercise, and the interviews, thus doing first readings of my data and tracing immediately apparent patterns and themes already while generating the data (Mayring, 2000). These notes showed that both the STEM education and the gendered educational STEM policy produced much affect. The analytical notes further illustrated that time played a role in forming girls' aspirations, with affect being produced in relation to productions of time, productions materialised, above all, in the physical STEM classroom and its interior, but also in the STEM artefacts of taxidermies, maps, and posters, as well as interactive touchscreens, all of which surrounded the girls in the STEM classrooms.

Having finished the data generation, I pooled all the data, including my initial analytical notes, as I was interested in seeing how the different data might inform and support each other through the coding. I then performed the second and third steps of the qualitative content analysis (Hsieh & Shannon, 2005), searching more closely for key statements related to affect and time, and how this connected in the formation of girls' STEM aspirations. For instance, I explored how the production of specific affective states such as happiness and pride plus more negative affective states such as inferiority related to the formation of these aspirations (see Article 3). Similarly, I investigated how different positive and negative affective states related to particular (im)materialised forms of time and thus how times played a role in this formation (see Article 1).

Hence, coding and analysing my data have been a matter of letting myself be allured into and affectively engaged with my data as well as of letting my research question(s) guide me in reading the data in a way useful for exploring how affects and times organise and govern girls' STEM aspirations.

**4.5 COVID-19 |** Conducting a qualitative PhD during a pandemic obviously involves the art of the possible and is an exercise in thinking creatively with (lacking) data. I had only completed a few months of initial observations when the pandemic struck, and the world, including schools and my workplace, shut down for prolonged periods. Throughout most of my PhD process, COVID-19 has been a less-than-ideal companion, meaning that major portions of this thesis have been conducted and written under lockdowns. Naturally, this has imposed practical – and indeed cognitive – limits on the explorations and analyses I have been able and allowed to perform.

The closings meant that a bit more than a year into the project – in Denmark the PhD process is three years long – I had to shift my initial focus on teaching practices from inside the STEM classroom to policy practices, which could be analysed through online searches. With policy practices now in focus, time and temporality gained importance in addition to affect. Indeed, time had fortunately already figured in the data from my partner school, as affect and time were interests from the outset. Moreover, I had chosen to partner with the school precisely because they were actively implementing a local gendered educational STEM policy. As such, I could glean some policy data from my data collected at the school, but because policy had not been my objective in generating the data, changing the focus was a challenging task.

Luckily, Danish schools briefly opened in the late summer of 2020, when infection rates were low. At this juncture, thanks to very supportive teachers, I was

able to conduct the photo-elicitation exercise originally planned for early spring of 2020. Conducted with grade 8 (grade 7 during observations), the exercise had to be rushed because schools risked closing anew as the seasonal changes threatened a rise in COVID-19 cases. However, the wonderfully cooperative girls made it all come together. The plan was to do an additional round of photos and interviews with grade 8 based on the experiences from the first round, and I had likewise planned to repeat the exercise in grade 7. Unfortunately, however, the pandemic precluded any repeat of the exercise within the timeframe of the project.

Overall, the pandemic posed major challenges to the project data generation, thus compelling me to renegotiate the thesis' aims and foci after I had initiated my originally planned data generation. As such, in the sense of theory and data I have sometimes felt as if writing this thesis was a desperate attempt to sew a patchwork blanket of kind-of-sort-of matching fabrics. However, now that I have worked through the thesis, the process of supplementing data generated at my partner school with policy data has seemed almost necessary as well as allowed me to undertake new types of analyses that further opened the field of glitter, an unexpectedly enriching development despite all the struggles.

**4.6 Positionality |** For the sake of transparency – and in keeping with the ethico-part of my ethico-onto-epistem-ological position – I will briefly reflect on how my own positionality as a female-identifying, young, White researcher has played into the study of how girls' educational STEM aspirations are organised and governed – in terms of my empirical encounters and focal points as well as of the analytical choices I have made along the way (Ravn, 2019).

As a woman currently targeted by gendered policy aimed to balance the representation of women and men – for instance, in academia – I have a rather critical view of such policy, finding that it often seeks to help women adapt to

rather than disrupt a patriarchal system (Sandager, 2021). Accordingly, my experience as a woman under the influence of gendered policy has to some extent probably spurred me to approach gendered educational STEM policy more critically than some others might. Moreover, my education in gender and queer studies plus political sociology has made me sceptical of the glittery images of gendered educational STEM policy, whereas the images undoubtedly have some more productive appeal to some girls, an appeal that could be scrutinised further.

My age appears to have played a large role in the data I could generate at the school. At first, the students read me as a teacher under training and thus as someone just there to learn. My presence was generally disregarded by students, who usually simply seemed to forget that the 'weirdo' in the corner was watching them. This enabled me to observe the children's 'unstaged' and 'natural' behaviour, but their lack of interest in me also minimised any informal communication, which could have provided useful insights into affective experiences, for instance.

For teachers, my age appeared to prevent them from taking me 'seriously' as a researcher and thus to perceive me more as a student doing a school assignment than post-graduate research. One teacher even asked if she could see my 'essay' when it was done. As such, the teachers neither acted as if any critical, public research would come from my classroom presence, nor did they appear to feel any need to impress me. Rather, they seemed at ease allowing me to observe their unfiltered teaching, and to feel safe sharing private matters about students and their relations to other colleagues. This gave me access to genuine but sometimes problematic information, didactics, and teaching practices, which required that I made extra ethical considerations in presenting my data.

The fact that both I and most of my partner school's student body are White made it easy for me to move about the school, and I easily acquired access to everything from students, to teachers, to managers. Had I not been White but of colour, blending in and gaining access would have been more difficult, but instead I could in many ways identify with the girls I observed and interviewed, as well as with the teachers I worked with. A few students had an ethnicity other than Danish, but none of the teachers – 'the adults' – were of colour, for which reason the students would probably have met me differently and with more questions had I not been White. As such, my study has indeed benefitted from me being White.

**4.7 A Non-comparative Study |** Some have criticised drafts of the thesis because, they contend, in studying only girls and not girls and boys, it fails to show a rightful picture of what actually organises and governs girls' STEM aspirations. This is seen as a shortfall because I can only put forward arguments about girls and cannot establish whether what organises and governs girls' STEM aspirations does not in fact also organise and govern those of boys. To this critique, I respond that I have no interest in claiming that what organises and governs girls' and boys' STEM aspirations differs. Indeed, in queering glitter, I point to glittery STEM as something that could allure boys as well as girls.

My choice to not do a comparative study is deliberate. Although I accept and adopt policy's understanding and terminology of binary gender in this thesis, I remain wary of the possibility that such a binary perspective might reinforce some of the very categories and stereotypes about girls and boys that may account for so few girls' aspiring to enter STEM (see Archer et al., 2013). Consequently, in this thesis I make no attempt to claim any differences between girls and boys or how their aspirations are formed. Indeed, this thesis' findings on girls might well emerge in a similar study on boys.

# CHAPTER 5
# ETHICS

Working with young people and in the often well-intentioned world of STEM has given rise to constant ethical considerations and concerns. I maintained a continual awareness that the young people I have been working with are minors in Denmark (under 18) and have thus participated in my research with their parents' consent as well as their own. Similarly, I have constantly reminded myself that the many policy actors and educators I have met are usually motivated by sincere ambitions of allowing girls to develop and follow STEM aspirations, even though their actions might sometimes seem otherwise. In this section, I describe the ethical considerations and concerns that have played a major role in the writing of this thesis. To provide transparency about the work divisions and contributions in this work, I also describe the co-authoring I have done with two of my supervisors, Justine and Signe.

**5.1 Researching Young People |** Denmark has no institutional review boards, and the law on data treatment and storage has recently changed. Consequently, research is no longer registered with the Danish Data Protection Agency, but with Copenhagen Business School's (CBS) legal office, which is then obligated to release information to the Danish Data Protection Agency if requested. My first action when starting the project was therefore to contact CBS Legal. The department advised me that, if the study was to be fully anonymised, I would not need consent to do observations in a classroom setting, as the classroom would have enough students to make the likelihood of any one student's being recognised low. Nevertheless, because the students were young, I still wrote an information letter to parents, which the assistant rector of my partner school ensured was distributed to all parents in the two school classes I was to observe. The letter informed them about my presence in the classroom as well as the aim of the study, so they could ensure their children knew about my presence as well as make any potential objections – also on behalf of their children. The letter

contained my own contact information and that of CBS Legal so parents could contact us with any questions regarding my research and data protection. I received no objections from either parents or students.

Before officially commencing my observation study, I visited both school classes to introduce them to the project and allow them to ask any questions about being part of my study. I emphasised that the study would be anonymised and that if anyone felt uncomfortable being part of the study, they could always tell me, and I would leave them out. I received no questions from the girls, but a few boys wanted to know why they were not included in the study. The boys laughed as they asked their questions, and seemed to understand that the focus on girls was because few girls aspire to STEM educations and careers compared to boys. In fact, in a short conversation I had with one boy, he told me how he himself had noticed that girls seemed to find tasks like dissecting animals in biology classes more disgusting than the boys did. As such, the boys seemed not to mind the study's emphasis on girls, but naturally this parameter meant that during the school's active involvement in my project, girls received greater attention than boys. This attention came from the teachers as well as myself, as they spent time involving and supporting me, and in certain instances they logically turned their focus to girls rather than boys. Although none of the boys appeared to react negatively to the extra attention showed to girls, some boys may have felt ignored or excluded. However, this played out neither in class, nor in conversations with the students or teachers, while it was also a disbalance that was difficult for me to rectify.

For the photo-elicitation exercise and interviews, the guidelines from CBS Legal differed because individual girls would be in focus. Consequently, I had to obtain parents' consent before the girls could participate in the study. Again, a letter was formulated to parents, informing them about the study and asking for their consent

on behalf of their children. All parents signed a consent form. I also prepared a form for girls to sign before the interviews, which, though not legally binding due to their age, sought to signal to them that they indeed had agency in the study and could withdraw at any time. Neither did they have to be interviewed by me if they preferred not to explain their photos. All girls signed the consent forms, and all voluntarily participated in interviews.

All data were uploaded to OneDrive for safe storage in line with the data protection guidelines set forth by CBS Legal. Photo-data were initially stored in a digital space created by the head of IT at my partner school. At the time of the photo-elicitation exercise, discussions about online bullying and digital infringement were at a peak in Denmark, and, to avoid any potential leak of the photo-data in the transfer between girls' phones and my e-mail, I had the data stored on the school's intranet. However, as soon as the girls' photos were cleared of containing any incriminating content, they were safely transferred to OneDrive and stored with the other data.

**5.2 All the Good Intentions, All the 'Bad' Actions |** Although this thesis presents a rather critical perspective on gendered educational STEM policy, the intentions of the many (policy) actors I have communicated with struck me as genuine. For instance, before the pandemic, large technology companies expended time and resources to tell me about their different educational initiatives for motivating more girls to aspire to STEM – in anonymity, meaning no official credit would be given for their generosity. Likewise, large foundations took the time to introduce me to their take on how to bring more girls into STEM and expressed great interest in supporting my research on how to motivate such change. Finally, by allowing me to critically observe classes, a group of teachers put themselves in highly vulnerable positions, trusting that this could ultimately enable more girls to develop and act on STEM aspirations.

Obviously, good intentions do not equal good actions, but good intentions should be honoured – albeit in a critical way if they are destructive rather than constructive. But how can one be critical without discrediting the object of one's criticism? How does one present a technology company that has good intentions, but reproduces discouraging gendered stereotypes covered in pink fairy dust? How does one communicate about private foundations that spend millions trying to bring more girls into STEM, but in a White, male-oriented manner that disqualifies ethnic minorities' and girls' interests in STEM? And how does one describe conservative STEM teaching practices that lead to ignorance of girls when these practices are performed by a teacher eager to contribute to gendered change by sharing precious time and experiences with me? These are some of the many questions I have had to repeatedly ask myself while writing this thesis, and various descriptions of some unfortunate STEM teaching practices, among other things, have also been written into and out of the thesis' articles multiple times. As such, I have had to navigate a field of good intentions frequently gone bad, while I have also constantly had to negotiate a balance between critiquing and giving credit to policy actors and teachers for their good intentions and active work.

To navigate these constructive versus unconstructive actions, I have found inspiration in theories on *affirmative critique*. Such critique is understood as exploring the potential and future directions of the problematic past and present times rather than simply criticising those past and present times and judging them as irrelevant (e.g., Zembylas, 2020; Staunæs & Brøgger, 2020; Staunæs, 2019). As the project has no direct normative aim of developing new actions and practices, I have not commented on or explored what specific new actions and practices could be developed from the past and present (failing) ones. Instead, I have used theories on affirmative critique to constantly remind myself of the need to introduce and work with my data responsibly and with attention to my own potential biases, thus

striving to ensure that policy actors, teachers, and other practitioners, can use my work to develop new and more constructive actions and practices.

**5.3 Co-authoring |** As my use of the Pete Doherty, *Sex and the City*, and Kim Kardashian references might reveal, I have found it tremendously important for this thesis to be mine and thus driven by my very own interests and by my indeed still developing skills as an emerging scholar. Luckily, I have been given all the support and freedom I could wish for in exploring whatever ideas came to mind for this study on how girls' STEM aspirations are formed. However, this hardly means I have been alone in writing the entire thesis. My supervisors co-authored two of the three articles that constitute the thesis' analysis, although at my request and with a view to helping me learn the publication experience of senior scholars. As such, co-authoring with my supervisors, Justine and Signe, has embodied an attempt to facilitate a learning process for myself and an experience that has been truly invaluable.

The idea for the paper written with Justine grew from a drafted paper I initially presented at my first work-in-progress seminar about a year into my PhD work. The paper has since taken endless shapes – including the shape of Article 2 – and remains on my desk for further tinkering. The paper was based on data from the biology classroom in my partner school, a setting where I was met with a chaos of un-glittery dead animals and dusty taxidermies. The animals immediately caught the attention of both Justine and my other supervisor Dorthe. Having myself also read these animals as materialised time disturbing the presence of the classroom, I joined with them in slowly initiating a common journey 'into' the animals to discover more details on the past time and post-colonial mysteries they harboured. The journey included a focus on the glitter with which I was already so fascinated, although it is only superficially introduced in the paper – a sign of where in my PhD process I was when we wrote the paper. As such, we were playing around

with the various tensions between glitter, darkness, and death we could lure out of gendered educational STEM policy when mirroring them in taxidermic practices.

I had already generated some of the data on the glittery gendered educational STEM policy used for the article, and although COVID-19 made generating data on taxidermic practices challenging, I still managed to make it to a taxidermy workshop, where I was generously allowed to spend a full day observing the work of a world champion taxidermist and his intern. As such, Article 2 is a result of common brainstorms, data generated and mainly analysed by me, and a writing process where I focused on the parts related to my data analysis and Justine qualified our argument with her great knowledge on hauntology.

The work on Article 3 started with Signe supervising my development of the photo-elicitation exercise used in the article when I visited her in Melbourne. The work on the exercise and data generation was not initially thought of as a collaboration, but as it progressed, it made sense to more actively include Signe in the article-writing process. Not being a classical sociologist, I found great support in having Signe as a sounding board, especially when writing the methodological parts of the paper.

Using the photo-elicitation exercise developed under Signe's supervision, I generated the photo- and interview data at my partner school. I also coded and initially analysed the data, as well introduced a few first versions of the theoretical and analytical sections, which we then used to build and finalise the article. In this way, my own theoretical interest has guided the analysis and findings of the article, while Signe finetuned its arguments and ensured that they were done with a more classical sociological framing and methodological discussion than I was accustomed to.

As one can probably read from the styles of the two articles, Justine and Signe come from – and work within – different traditions. As such, in working with each of them, I have had to adapt to these divergent ways of approaching data and writing. This has been both fun and challenging, but most importantly it has served the purpose of letting me learn about scholarly work from differing positions.

# CHAPTER 6
# ANALYSIS

In this chapter, I present the three articles that make up the thesis' analysis, while I also use this chapter to introduce the analysis that should assist in answering the research question(s) of the thesis. Article 1 will assist in answering guiding question 1: how does gendered educational STEM policy attempt to organise and govern girls' STEM aspirations through productions of affect and time? Article 2 will assist in answering guiding question 2: which futures does gendered educational STEM policy organise, and how do these condition gendered subjectivity? And lastly, Article 3 will assist in answering guiding question 3: in what ways do girls affectively and temporally relate to STEM? I use the findings of the articles to explicitly answer the three guiding questions in the following Discussion and to address the overall two-part research question: how does gendered educational STEM policy organise and govern girls' STEM aspirations? And what implications might this have?

**6.1 Article 1 |** Three-dimensional Affective Governmentality: Bright Futures, Bleak Pasts, and the Governing of Gendered STEM Aspirations (Sandager)

The article is targeted *Discourse: Studies in The Cultural Politics of Education* as a Research Horizon Article.

**Three-dimensional Affective Governmentality: Bright Futures, Bleak Pasts, and the Governing of Gendered STEM Aspirations**

**Abstract**

This paper explores the new insights we might get into the governing operations and effects of aspiration-raising policy, if we think of such policy as functioning within a non-linear rather than linear temporality. The paper builds upon the current literature on aspiration-raising policy, suggesting that such policy operates through productions of future optimism, continuously governing students towards better futures. Accordingly, the paper develops a novel concept of affective governmentality, including a three-dimensional focus on discourse, affect, and time. Taking a vignette from fieldwork commenced at a Danish primary school as its empirical point of departure, the paper subsequently uses this new concept to explore how aspiration-raising policy produces negative pasts along with future optimism, while the policy also constitutes learning spaces of affective/temporal governing disorder rather than of sole future optimism. The main contribution of the article lies in the conceptual development of a three-dimensional affective governmentality and a subsequent discussion of how this concept might be applied to the study of aspiration-raising policy, broader education policy, as well as educational studies in more general.

**Keywords:** affective governmentality, aspiration-raising policy, Barad, gender, STEM, time/temporality

## Introduction

Against the backdrop of a future lack of STEM graduates in Western countries and low numbers of women graduating with STEM degrees (OECD, 2017; UNESCO, 2017a), a range of gendered Science, Technology, Engineering and Technology (STEM) policies (GSTEMP) are currently implemented to foster girls' aspirations to study STEM-related educations and ultimately careers. Comparing eight representative member nations of the OECD, Dard and Payne (2021) show that although more women than men receive bachelor's degrees, women comprise far less than half of STEM graduates in every nation except one. The low number of women graduating with STEM degrees is also found in the OECD member nation of Denmark, where the empirical data in this article stems from. In Denmark, women only make up a third of the students that graduate with STEM degrees (Faber et al., 2020), while forecasts estimate that by 2025 Denmark will lack approximately 13.500 STEM candidates – a number that will increase with 50% by 2030 (DEA, 2019; IDA, 2018).

With the aim of fostering STEM aspirations in girls, GSTEMP can be theorised as aspiration-raising policy. Such policy is described as policy that aims at fostering specific aspirations in students to overcome societal problems (Spohrer et al., 2018; Sphorer, 2016; Sellar, 2013). For instance, aspiration-raising policy has been implemented in attempts to foster aspirations for higher education in working class youth to generate social mobility and improve economic growth (Spohrer et al., 2018; Spohrer, 2011) as well as social equity and justice (Sellar & Storan, 2013, p. 47). By definition, aspiration-raising policy operates through positive affective investments in the future and by promising the students whose aspiration is in question 'a "good" life through education' (Sellar & Storan, 2013, p. 49). As such, aspiration-raising policy is understood as operating through productions of

future optimism and promising students that more desirable futures are attainable through specific educational choices.

Operating through productions of future optimism, aspiration-raising policy can be read as functioning within a linear temporality; aspiration-raising policy installs a future-orientation in students that guides them from the past, to present, and into the future (see Somerville, 2013). It has been argued that economic structures and unequal social relations are likely to hinder that all students succeed in gaining a positive future through education, and that the promise made to them by aspiration-raising policy will disappoint (see Hart, 2012; Mains, 2012). However, the future optimism seems to remain intact in students, while it also takes the form of a 'cruel optimism' (Berlant, 2011) that continuously directs (some) students towards unattainable better futures (Sellar 2013; Sellar & Zipin, 2019; Sellar, 2016).

In this article, I build on the insights from the current literature on aspiration-raising policy and the description of such policy as operating through positive affective investments in the future. But with a focus on GSTEMP, I also explore what new understandings we might get of the operations of aspiration-raising policy if we think of such policy as functioning within non-linear rather than linear temporality (Pors, Olaison & Otto, 2019; Barad, 2013, 2017). Thus, I ask: 1) Which other affective times than future optimism does GSTEMP produce? 2) How does GSTEMP produce these affective times? And 3) what (de)motivating aspirational learning spaces might the affective times constitute? I explore potential answers to the three questions with the use of the current literature on affective governmentality, but in order to capture the temporal productions of GSTEMP in addition to the affective ones, I add to this literature a focus on time. In that way, I develop what is the main contribution of this paper, namely a three-

dimensional concept of affective governmentality that combines Foucault's original concept of governmentality with theories on affect and time.

I begin the article by introducing the current literature on affective governmentality through which I conceptualise an affective governmentality with a specific focus on time. Second, I explore answers to the three questions presented above by unfolding the concept in the context of a group of international GSTEMP and a vignette introducing data from ethnographic fieldwork done at a Danish primary school that has actively been implementing a local GSTEMP. Third, I summarise the development of the three-dimensional affective governmentality, and the knowledge on the affective and temporal operations, effects, and implications of aspiration-raising policy, which this new concept might bring forth. Lastly, I conclude on the wider relevance of the concept and how it might provide relevant insights into broader educational policy as well as to educational studies in more general.

**Affective governmentality – a new concept**

Foucault's original notion of *governmentality* (1991, 2009, 2010) designates a form of power that revolves around individuals' self-governing processes. Governmentality comprises the idea that power is not something a government exercises over the people, but that the people willingly exercise over themselves (Foucault, 1991). Aspiration-raising policy has already been theorised as governmentality. Raco (2009) has argued that aspiration-raising policy, in contrast to welfare politics that operates through state-sponsored redistribution, operates by making subjects responsible for improving themselves by adopting a specific aspirational behaviour. Spohrer et al., (2018) have stated that aspiration-raising policy operates by portraying disadvantaged youth as 'deficit' and 'potential' which requires social mobility through an inner transformation among the youth (p. 227). Lastly, in analysing how aspiration-raising policy operates by making

subjects responsible for their own progress, Sellar and Storan (2013) have contended that:

> The politics of aspiration also enables a deft sleight of hand for governments, positioning them as advocates and enablers of social mobility, but without making them accountable if mobility does not occur, in which case a lack of aspiration can be blamed on individuals who have not made the most of the 'opportunities' available to them. (p. 46)

Governmentality scholars argue that subjects are persuaded to self-govern through productions of discourse (Rose, 1996, 1999) and normative ideals (Fleming & Spicer, 2003), which convince subjects about the purpose of adopting and abandoning specific social and thus aspirational behaviour. However, within recent years, there has been increasing interest in the concept of *affective governmentality*, emphasising that not only discourse and normative ideals but also affect governs the self-governing of subjects. Bjerg and Staunæs (2011) have illustrated how student behaviour is governed within productions of shame and acknowledgement, which ensure that student behaviour is aligned with educational goals. Shoshanna (2021) has showed how the evocation of gratitude is used to govern students at an Israeli state-run boarding school to obtain certain governmental-educational objectives. Further, Sandager (2021) has demonstrated how the management tool of mentoring oscillates between producing shame and (un)happiness to govern women who aspire to enter leadership to adopt a masculine behaviour that is recognisable as 'true' leadership behaviour. Hence, not only discourse and normative ideals but also affect governs behaviour, and since aspiration-raising policy is seen to operate through productions of future *optimism*, and thus through production of affect, it makes sense to analyse the operations of aspiration-raising policy as affective governmentality and thus as governmentality with an added focus on affect.

### *Affect and objects*

In the following, I develop a three-dimensional concept of affective governmentality that seems especially useful for explaining the governing operations of aspiration-raising policy. I find my inspiration in Ahmed's (2004, 2010) queer feminist theory on affect because this theory allows for a complex three-dimensional focus on both the discourse, affect, *and* time produced by aspiration-raising policy. Aspiration-raising policy is not affective governmentality in a 'classical' sense as the policy does not just produce a governing optimism but a governing *future* optimism. Thus, an analysis of affective governmentality aiming to explain the governing operations of aspiration-raising policy must not solely focus on discourse and affect but also time.

As a point of departure in our development of a new concept of affective governmentality based on the theories of Ahmed, we begin with the following quote:

> I think that the distinction between affect/emotion can under-describe the work of emotions, which involve forms of intensity, *bodily orientation, and direction* that are not simply about 'subjective' content or qualification of intensity. Emotions are not afterthoughts but shape how bodies are moved by the worlds they inhabit. (Ahmed, 2010, p. 230, emphasis added).

Ahmed argues that affect/emotion is a matter that orientates and directs our bodies, while also ascribing a relevant governing aspect to affect. Moreover – and importantly for understanding the governing function of time – she contends that affective states are not subjective and therefore neither produced nor inhabited by our bodies as autonomous or socially detached corpuses. Rather, affective states are evoked in the encounter between our bodies and the different objects that

surround them (Ahmed, 2004, 2010). Discursive narratives invest objects with affective meaning that is transferred to our bodies in the instant we encounter them. Therefore, affective states are also a result of encounters between our bodies and affectively invested objects (Ahmed, 2004, 2010).

Ahmed (2010) defines objects broadly. She argues that objects are phenomena that take material shapes such as specific (hetero-normative) family constellations that are invested with a promise of happiness, but also immaterial shapes such as 'values, practice, styles, as well as aspirations' (p. 29). In this article, I work with the objects of times, which arguably take both material and immaterial shapes. Time can be described as invisible, social structures that move human bodies by allowing them to make sense of and navigate the worlds they inhabit (e.g., Lingard, 2021), but it can also be explained as materialised in our physical surroundings. I elaborate on the materiality of time in the section below, where I introduce Barad's theories on time to finalise the new concept of affective governmentality as a notion that has relevance for explaining the complex discursive/affective/temporal governing productions of aspiration-raising policy.

***Objects of times***

Barad (2013, 2017) states that time exists diffractively. By diffraction, they mean 'the entangled nature of differences' (Barad, 1996, p. 381), while temporal diffractive existences should be seen as different times taking their existence in and through each other. Because time exists diffractively, we cannot separate nor hierarchise between past, present, and future time; without past and present there is no future, without present and future there is no past, and without past and future there is no present (Barad, 2017). As such, we can also not understand time as functioning in the linear way that seems to be suggested by the current literature on aspiration-raising policy. Rather, when (positive) future time is produced, the

same must be the case for past and present times, as these times will unavoidably exist in and through future time to disturb any linearity between the times.

In addition to arguing that time exists diffractively, Barad (2017, 2007) contend that time is materialised. To exemplify their argument, they turn to the past nuclear destructions and the current disabled bodies of Hiroshima. These bodies are, according to Barad (2017), materialised, non-linear, non-hierarchical intra-actions of time in being fleshy physicalness that is presence in the sense of existing body cells; past in the sense of the cells being cancer-ridden due to previous bombings; and future in the sense of the cancer-ridden cells pointing to near death rather than long life (Barad, 2017). Thus, through the example of the disabled bodies of Hiroshima, we see that different times and materiality are threaded in and out of each other to constitute a physical, temporal reality.

When we combine the theories of Foucault and Ahmed with the theories of Barad, we get a three-dimensional concept of affective governmentality that explains social and thus aspirational behaviour as governed through a production of discursive narratives, which invest affective meaning in the (im)material objects of different times that diffractively exist in and through each other. As such, we also get a concept that allows us to understand the governing of aspirations as something that takes place in (im)material, diffractive discursive/affective/temporal learning spaces. In order to elaborate further on this idea, I use the new concept of affective governmentality to explore answers to the three questions asked in the introduction. I begin by addressing the first two questions and explore how the new concept can help us understand which other affective times, aside from future optimism, are produced by GSTEMP and how GSTEMP produces these affective times.

**Future optimism – and negative past**

The present field of GSTEMP is vast but turning to the key international actors within this field, we find the OECD (2017) who has published a series of reports identifying the need to foster girls' STEM aspirations. Further, we find UNESCO (2017a, 2017b), who in addition to publishing reports, has launched different training programmes in gender-inclusive STEM teaching that aim to foster STEM aspirations through the development of new gendered STEM education. Lastly, we find the EU (2012) who has attempted to foster STEM aspirations in girls through the campaign *Science: It's a girl thing*, which entails, among other things, a video with a group of laughing girls experimenting in a shiny lab and a colourful website where girls can read about different STEM careers. Although none of the international GSTEMP explicitly produces discursive narratives that make positive affective investments in the object of future time by promising future benefits of STEM education, they arguably do so implicitly. As such, the affirmative attention these initiatives give to getting more women into STEM assists in producing a narrative about the future of STEM as a place where girls are welcome and belong. However, in exploring the affective and temporal productions of GSTEMP with the insights brought to us by the new concept of affective governmentality, we see that GSTEMP does not only invest positive affective meaning in the future. It similarly invests negative affective meaning in the object of past time, which diffractively exists in and through the future. By producing a narrative that points to the past as something we should leave behind in favour of the future, GSTEMP implicitly produces another narrative about the past as negative, compared to the more attractive future.

Turning to commercial and market-driven GSTEMP (Shore & Wright, 2011), we see the implicit discursive narratives and affective investments in the objects of past and future time, become more explicit. For instance, Microsoft (2016a,

2016b) has developed the campaign *#MakeWhatsNext* that includes a range of videos of smiling girls in innovative labs equipped with impressive AI tools and large interactive screens. The videos produce a discursive narrative about a fun and playful future in STEM lived in shiny labs. However, in one of the videos we also meet a group of girls who expose how the many science inventors they encounter in the school's STEM curriculum are all (White) men. The video responds to this fact by flashing a range of (forgotten) names of women inventors along with images of their ground-breaking STEM inventions and ends with the statement 'Let's celebrate all things women made' (Microsoft, 2016b). As such, the video produces a narrative about the future of STEM as a place where women will be celebrated, but within this framework exists another narrative about the past as a place where women have been neglected in favour of men. Thus, in investing positive affective meaning in the object of future time, GSTEM simultaneously invests negative affect in the object of past time, while GSTEMP also produces both positive futures and negative pasts, diffractively existing in and through each other.

In using the three-dimensional concept of affective governmentality to explore the discursive/affective/temporal governing productions of GSTEMP, we see that the policy produces discursive narratives that invest positive affective meaning in the future, but also negative affective meaning in the past. In that way, GSTEMP operates through the production of a governing future optimism but also through the production of a negative past that diffractively exists in and through the future optimism to disturb any linear movement from negative past to positive future. I build on these findings as I explore an answer to the last question laid out in the beginning of this article: what (de)motivating aspirational learning spaces might the affective times constitute? I explore an answer to this question by unfolding the new concept of affective governmentality in relation to a vignette based on

observations from a Danish primary school which has actively been implementing a local GSTEMP.

***Vignette: The affective temporality of physics/chemistry education***

As the contribution of this paper is primarily conceptual, the role of the empirical material presented in the following vignette is not to represent 'reality,' but instead to facilitate theoretical reflection (Alvesson & Kärreman, 2007). For such purposes, vignettes have proven to be particularly fruitful (Sampson & Johannesson, 2020) since 'tales from the field' (Van Mannen, 2011) like the one below 'may be mobilized as a critical dialogue partner – not a judge or a mirror – that problematizes a significant form of understanding, thus encouraging problematization and theoretical insights' (Alvesson & Kärreman, 2007, p. 1266).

The vignette draws on anonymised data from ethnographic fieldwork done at a Danish co-educational primary school in late 2019. The school had actively been implementing a local GSTEMP for more than two years at the time. The fieldwork was done among girls in 7$^{th}$ grade (12-13 years old) in their STEM education and was part of a larger project focusing on the formation of girls' STEM aspirations.

The local GSTEMP implemented at the school states that it 'wishes to create even more exciting professional environments, which […] can bring STEM education back to life' [the local GSTEMP]. As such, the local GSTEMP is aligned with the international GSTEMP by producing narratives that simultaneously invest positive affect in the future and negative affect in a 'dead' past that needs to be brought 'back to life'. The local GSTEMP accordingly suggests reviving STEM education by designing education that integrates 'technological developments, and to a lesser extent a book and a chair' and 'new didactics' [the local GSTEMP].

The vignette is comprised of observations from one specific physics/chemistry class that took place in the school's physics/chemistry classroom, which in many

ways mirrored the descriptions and images of shiny labs from the international GSTEMP explored above:

Early one morning, I waited with a group of girls outside the physics/chemistry classroom. When the teacher arrived to let us into the classroom, the narrow red-brick hallway, dimly lit with fluorescent ceiling lights, suddenly opened into a white room, bright with daylight flooding in through the floor-to-ceiling windows on the exterior wall. The classroom interior similarly contrasted with the scratched-up wood laminated furniture in the hallway, boasting two new large working stations made in light greys and surrounded by black stools where about ten students could sit and collaborate. The interior brought in the future, precisely fitting the local GSTEMP's description of a shift away from the traditional 'book-and-chair' work setup. On the wall, facing the students' working stations, the traditional blackboard had been replaced by a large, shiny interactive touchscreen to accommodate the 'technological developments' that the policy had similarly described as tantamount to the 'more exciting' future. On entering the room, the girls appeared to be hit by a cheery energy. This was expressed through the girls' chatting becoming faster and higher pitched and smiles spreading on their faces. One girl even did little circling dance moves with her hands as she singingly walked through the door.

The teacher began the class by connecting his MacBook to the big interactive touchscreen. Via the large screen, we could follow how he activated different digital tools to bring forward a description of the homework that the students had prepared for today. As the digital scheme of the homework was displayed on the screen, it was clear that today's lesson would be on the periodic system and different chemical elements. A group of students had prepared a short presentation on a specific chemical element that they were going to present to the other students. Before the presentations began, the teacher pulled out from his bag two crumbled lists; one had the names of the students on it, and one had the names of the 30 different chemical elements. Based on the two lists, the teacher began an exercise of calling out a student name followed by either the full name or the abbreviation of a chemical element. The point of the exercise was for the student to quickly list either the full name of the abbreviation or the abbreviation of the full name. The energy of the room changed as this exercise of rote learning was introduced. The girls that had cheerfully entered the classroom suddenly became quiet. Many of the girls were visibly uncomfortable with the exercise and a few blushed as their name was called upon.

After the students had been through the rote learning exercise and had delivered their short presentations on chemical elements, the teacher returned to use the large interactive touchscreen. The screen was used to illustrate the behaviour of electrons. The energy of the room shifted again, and I saw girls smilingly point to some of the colourful illustrations on the screen. A girl asked a question about the order of some of the elements. This made the teacher turn around and pull down an old, flawed chart with the periodic system. The chart was visibly sun-bleached – or maybe just *time*-worn – and it made a dreadful sound as it was unrolled through a rusty hoisting system. One girl put her hands to her ears while another girl wrinkled her nose to demonstrate her discomfort.

Later, I observed the girls enjoy themselves doing some small experiments around the new collaborative working stations. They laughed and two girls high-fived as they succeeded with their experiment. It made sense that the local GSTEMP would suggest this type of work setup rather than a 'book-and-chair' setup as it allowed for the girls to interact and collaborate on their experimenting activities.

In the middle of the experiment exercise, a girl suddenly noticed some artefacts atop two cabinets in the back of the room. Someone had clearly attempted to hide away these artefacts due to their outdated status. The artefacts were metallic and dusty, and a girl shrieked: 'they are disgusting'. Keenly aware of the past status of the artefacts, another girl asked the teacher: 'How old are they – from the last century or something?'. The teacher replied that they were older than him and thus 'older than a lifetime'. The girls appeared baffled by the teacher's answer, and they laughed a little confused.

## New understandings with affective governmentality

With the findings from the explorations above in mind, we can see that the local GSTEMP presented in the vignette constitutes an aspirational learning space of an (im)material governing future optimism. The GSTEMP has resulted in a STEM classroom that takes the shape of a shiny lab, which is furnished with light interior that allows for the girls to collaborate, and a large interactive touchscreen installed for the use of innovative didactics. As such, the STEM classroom, and the teaching activities it enables, mirror GSTEMP's narratives about a positive future

in STEM. However, we also see that the (im)material future optimism does not exist alone in the STEM classroom. In and through the (im)materialised future optimism exists an (im)material governing negative past that continuously disturbs the governing effects of the future optimism. The negative past disturbs the governing effects of the future-oriented STEM classroom and education in the immaterial form of the teacher's comments about his (exceeded) age and conservative didactics such as rote learning. Moreover, the negative past disturbs in the material form of a time-worn map that makes screeching sounds due to its aged rusty hoisting system, pieces of crumpled papers, and dusty artefacts.

When exploring the vignette with the three-dimensional discursive/affective/temporal focus that the new affective governmentality allows for, we can thus argue that (im)material governing future optimism and negative past diffractively exist in and through each other in the aspirational learning spaces that GSTEMP constitutes. Moreover, we can contend that GSTEMP constitutes (im)material diffractive discursive/affective/temporal learning spaces, where girls are not solely under the governing forces of future optimism. Instead, girls are left in an affective and temporal governing disorder, which makes it hard to predict whether they will adopt an aspirational behaviour towards a future in STEM or not.

By exploring the aspirational learning spaces that GSTEMP constitutes with the use of the new concept of affective governmentality, we see findings that challenge the idea of aspiration-raising policy as solely operating through the production of future optimism within a linear temporality. As such, the new concept of affective governmentality also appears to allow for us to nuance the arguments of the current literature on aspiration-raising policy and enable more detailed analyses of the operations as well as governing effects and implications of such policy. However, as the primary aim of this article is to develop new theory

and not bring novel empirical insights, the findings of the article should be seen as pointing to the relevance of further explorations of the affective and temporal operations of aspiration-raising policy rather than revealing new 'truths' in and of themselves. The findings of this article is thus meant to inspire further explorations of aspiration-raising policy, which can inform the future planning, implementation, and analysis of aspiration-raising policy with greater predictability and efficiency.

**Concluding discussion**

In this article, I have built on the insights from the current literature on aspiration-raising policy and the description of such policy as operating through productions of future optimism and within a linear temporality. However, with a focus on GSTEMP, I have also asked what new understandings we could extract from the operations of aspiration-raising policy if we think of the policy as functioning within non-linear rather than linear temporality. I have asked: 1) Which other affective times than future optimism does GSTEMP produce? 2) How does GSTEMP produce these affective times? And 3) what (de)motivating aspirational learning spaces might the affective times constitute?

To answer these questions, I have developed a new three-dimensional concept of affective governmentality that combines Foucault's original concept of governmentality with Ahmed's queer feminist theories on affect and Barad's theories on time. The concept is defined by paying attention to 1) discourse, in the sense of discursive narratives, 2) affect, understood as the affective meaning established by the discursive narratives, and 3) time, defined as diffractively existing (im)material objects that are invested with the affective meaning, established by discursive narratives, and transferred to bodies in the instant they encounter the objects of times. The concept seems especially useful for analysing aspiration-raising policy which explicitly attempts to govern through affective

investments in time, but it could also be used to explore broader educational policies since all policy is based on the logic of wanting to change the past and status quo in favour of more desirable futures, may it be socially or economically. In fact, educational policy scholars have recently called for tools that can allow for a greater focus on time in policy analysis, while there is also a new recognition of time as not solely being a neutral matter that frames policy, but instead a governing matter that shapes policy and its effects (Lingard, 2021). Moreover, the concept could be instructive to explore educational fields outside of policy, such as new movements of educational populism that govern through productions of nostalgia (Watson & Barnes, 2021) or the design of entrepreneurship education, investing success or failure in the object of future time through discursive narratives about subjects' (in)abilities to nurture, for instance, family ties and social relations (Jones & Giodarno, 2020).

In exploring answers to the three questions, I have unfolded the new three-dimensional concept of affective governmentality in the context of a group of international GSTEMP and a vignette from ethnographic fieldwork done at a Danish primary school that has actively been implementing a local GSTEMP. The explorations have revealed that GSTEMP does not only solely operate through investing positive affective meaning in future time, but also through investing negative affective meaning in past time. Moreover, the explorations indicate that in making such investments, GSTEMP constitutes aspirational learning spaces where (im)material future optimism and negative past diffractively exist in and through each other to disturb linear developments from negative past to positive future. The affective, diffractively existing times arguably constitute a space of uncontrollable governance where girls are as likely to be positively motivated to enter STEM as they are to be negatively demotivated to enter STEM. As such, it is hard to predict whether girls will be predominantly influenced by governing forces

of future optimism or negative past when navigating the aspirational learning spaces constituted by GSTEMP. Therefore, it is also difficult to foresee whether girls will experience STEM as attractive or not. However, as this article is primarily aimed at developing new theory in the form of a new concept of three-dimensional affective governmentality rather than presenting novel empirical insights, it will end by calling for further explorations of the affective and temporal governing productions, effects, and implications of aspiration-raising policy instead of making final conclusions.

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## 6.2 Article 2 | Ghostly Mirroring – How Taxidermy Could Teach Us Something Important About Current Attempts to Inspire STEM Aspirations in Young Women (Sandager & Pors, 2022)

The book chapter is published in (ed. Mifsud, D.) *Narratives of Educational Leadership: Representing Research via Creative Analytical Practices*. Singapore: Springer.

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Please note that this book chapter has been edited to comply with the formatting of this thesis and therefore differs in that respect from the published version. Moreover, minor language revisions have taken place as e.g., the word 'affective' – of unknown reasons – has been changed to 'effective' throughout the final published version.

In order to meet the requirements and focus of the book, we were asked to present our argument within a framing of methodology, and the book chapter is therefore written with a focus on methodology despite my reading of the book chapter as an analytical contribution in the thesis.

**Title: Ghostly Mirroring – How Taxidermy Could Teach Us Something Important About Current Attempts to Inspire STEM Aspirations in Young Women**


## Abstract

This chapter develops a hauntological methodology apt to explore affectively saturated moments, where distant pasts suddenly seem capable of evoking intensities and raising questions about the present. We develop and illustrate this methodology in relation to current policy narratives aiming to inspire young women to become interested in educations and careers in the STEM fields. We begin in one particular ethnographic moment where a group of school children enter a classroom for a natural science lesson and encounter some old, dusty taxidermy moulds. We dwell in this moment to lure out the many different histories, affects, material techniques, epistemic regimes, and desires to know and master knowledge that come together in this moment. With an open mind and a methodological ambition of adding layers to our understanding of current STEM narratives, we ask the speculative question of how particular practices, power, ideas, normativities, politics, affects, and techniques have been embedded in these taxidermies over time. The chapter offers a methodological approach we term *ghostly mirroring* as a way to catch glimpses of other and maybe less innocent tales than those apparently told by current glittery STEM narratives. This methodology does not aim to settle or resolve questions. Instead, it aims to open new inquiries of underlying assumptions in current policy narratives and to enrich conversations about gender and aspiration in educational leadership.



**Keywords**: Hauntology, Derrida, STEM-aspirations, Taxidermy, Gender, Educational leadership

## Introduction[7]

This chapter proposes ghostly mirroring as a methodology for bringing out other stories (un)resting within contemporary narratives about educational leadership. We are interested in the empirical and contemporary phenomenon of policy narratives aiming to get more young women to choose an education and, subsequently, a career within the fields of Science, Technology, Engineering and Mathematics (STEM). Such discourses are prolific in both national and international contexts; policy actors such as the OECD, UNESCO, and the EU, as well as private organizational actors such as Microsoft and Google, have all invested large amounts of money and attention in *glittering* up the field of STEM. Educational initiatives, such as glossy campaigns, have been developed to motivate more girls and young women to enter STEM and thus to address the current lack of labour, globally traced within the STEM field (OECD, 2017). As such, high hopes have been built for new and more bright futures when it comes to the representation of young women in STEM.

As part of a research project aiming to illuminate how STEM aspirations are nurtured (or not) in primary schooling, one of the authors found herself in the mundane setting of a biology classroom. All of a sudden, she, as well as four girl pupils, discovered that they were being observed by a number of animals, dead, preserved, and placed in all corners of the classroom. The preserved animals were covered in thick layers of dust, suggesting that they were not often put to use in the teaching. The preserved animals evoked varied affective responses. As such, the girl pupils expressed their disgust in loud registers at the same time as they seemed fascinated, indeed, somehow attracted to the dead, dusty beings. For the researcher, the encounter with the preserved animals invited an interest and a

[7] This research was made possible by a grant from the Independent Research Fund Denmark. Grant number 8091-00051B.

strange longing to know more about them.[8] This brief encounter between preserved animals and political ambitions to inspire STEM aspirations and dreams with glittery campaigns seemed rich with analytical possibilities. Could this moment be host to a set of questions or concerns that might set in motion new analytical inquiries and insights? Yet, the researcher was unsure of exactly why as well as how to make the moment speak. As such, she was facing a methodological challenge of how to unpack a dense, saturated moment so as to bring out the multiple affective histories that came together in it.

In studying current policy narratives, emphasizing the importance of getting more girls and young women interested in STEM, we are interested in questions about the implicit assumptions about aspiration, motivation, gender, and knowledge in such narratives. What is assumed about how aspiration and motivation can and should be inspired in girls and young women? What ideas about knowledge and forms of knowing are in use? How do inbuilt assumptions about aspiration, motivation, and gender constitute conditions of possibility and impossibility for subjectivity? With these general questions in mind, we take a point of departure in the ethnographic moment described above and we ask: What sort of concepts, theories and analytical approaches may help us to unpack this moment? Intuitively, the moment felt saturated with affective tensions (e.g., disgust/attraction), but the moment also felt like a compression of time. It contained both contemporary narratives fuelled with hope and futurity, and the preserved animals as some sort of symbolic stand in for a past of un-inspiring, dusty teaching that these narratives want to escape. But how to dwell analytically in an affectively dense and temporally compressed moment?

Our proposition is that this methodological challenge has to do with a question of how to lure out the tensions and histories that, albeit only in a brief and elusive

[8] The authors would like to thank Dorthe Staunæs for insisting upon the importance of these taxidermy moulds.

moment, make themselves felt as a compression and an affective density. This is a question of how to evoke and capture histories that are not really there and immediately available, yet they are not absent either. How to sense, bring out, and put in motion again, what Armstrong (2010) has called the embedded spectrality of culture? As Blackman (2019a: xiii) argues, present narratives are haunted by the histories that are erased for the narratives to appear coherent and orderly. It is these hauntings that we want to lure out in order to put them to work in new and other arguments and understandings (Blackman, 2019a: xiii). Put differently, we are searching for methodological resources to bring into the picture the resonances, echoes, absent–presences, or other spectral accumulations that exist outside the domain of the present and immediately apparent discursive manifestations (Armstrong, 2010).

In this chapter, we evoke Derrida's ideas about hauntology developed in *Spectres of Marx The State of the Debt, the Work of Mourning and the New International*. Famously, for Derrida, the figure of the ghost reveals that history neither begins nor ends. In his analysis of the endurance of Marxism despite the supposed triumph of capitalist liberal democracy, Derrida introduces the concept of hauntology to trouble the term ontology. He writes: "It is necessary to introduce haunting into the very construction of a concept. Of every concept, beginning with the concepts of being and time" (1994: 202). Ontology and hauntology sound quite similar when spoken, but hauntology nevertheless reminds us that ontology is haunted by a corrupting and contaminating undercurrent: a spectral working that destabilizes, in a more or less subterranean fashion, any existence and any self-sufficient present (Derrida, 1994, 174; Jameson, 1999, 39). We work with the concept of hauntology as one way of engaging with the complexities of present policy narratives and the ways in which multiple pasts and futures continue to linger in spite of how certain forces work to forget and derecognize them.

More specifically, we suggest an approach we term *ghostly mirroring* as a methodology to lure out the absent–present forces at work in particular *thick moments* (Edensor, 2012). This methodology builds on the theoretical concept of hauntology to draw analytical attention to the spectral forces at work in certain scenes or moments. Ghostly methodology is an invitation to ask questions about how past struggles, controversies, or affective anxieties continue to linger in spaces or things, although they are not immediately visible or present (Ratner & Pors, 2013). In our example, we take a point of departure at the moment described above to explore the possible spectral forces emanating from taxidermy moulds. More specifically, ghostly mirroring is a methodological practice involving three different analytical movements. First, we take a point of departure in an encounter between odd worlds (in our case shiny, glittering narratives on girls in STEM and preserved animals) and allow ourselves to wonder about the questions this moment could bring forward. Second, we consider, in speculative registers, the affective histories that may linger in particular things or spaces (in our case preserved animals). Third, we use these speculations as an analytical mirror in which to catch a glimpse of other and less immediately available forces of a contemporary phenomenon (glittery narratives on girls in STEM).

In what follows, we will first introduce the policy narratives aiming to inspire more young women to enter STEM education and careers, and present an excerpt from the ethnographic fieldwork, where one of us encountered the preserved animals. Second, we explicate our methodology of ghostly mirroring. Third, we explore the histories that might linger in preserved animals in order to create a mirror, in which we can reconsider the glittery STEM initiatives. This will take us on a visit to a world-leading taxidermist as well as lead us to explore epistemological practices of naming and cataloguing and their possible entanglement with colonial forms of power. Finally, we discuss how this

methodological approach of piecing together possibly lingering histories may help us to reconsider and understand the darker sides of contemporary policy narratives. We also discuss the implications of such reconsiderations for critical educational leadership.

**Glitter, Girls in STEM, and Educational Leadership**

The policy focus on women's lacking representation in STEM seems to be ever growing and various policy actors have launched educational initiatives aiming to inspire more young girls to aspire to the field of STEM. Internationally, the OECD has published various papers and reports pointing to the need for motivating more women to enter STEM (e.g., OECD, 2017), and UNESCO has launched initiatives such as TeachHer (UNESCO, 2017a); The International Symposium and Policy Forum; Cracking the Code (UNESCO 2017b); and alternative forms of training in gender responsive STEM teaching (UNESCO 2017c).

In the national policy context of Denmark, the phenomenon of girls in STEM has also received great attention. In 2018, the Danish Government invested 180 million DKK in the development of a national STEM policy (National Naturvidenskabsstrategi, 2018), and it supported the development of Teknologipagten [The Technology Pact] with 75 million DKK to ensure that more young girls develop an interest in STEM. Furthermore, a range of local governments, carrying the main responsibility for primary education in Denmark, have devoted large amounts of money to the design of their own unique STEM policies, guiding schools on how to create new and more exciting forms of STEM education, especially for girls (e.g., Dragør STEM Strategy; 2018 Lyngby-Taarbæk STEM Strategy, 2017; Thisted STEM Strategy, 2015).

Such policies aim to foster a kind of educational leadership that actively works to make the STEM sciences appear more attractive to girls and young women.

However, it is not only local, national, and international policy actors that take part in building such a narrative about educational leadership as efforts to make girls interested in STEM, so do a range of private foundations and corporations that have financially invested in the design of different educational initiatives. Microsoft, for instance, has invested great amounts of money in the continuously running campaign #MakeWhatsNext, showing girls inspiring stories of how women have played important roles in some of the world's most important tech and science inventions, despite their efforts being largely ignored in the history of science (Microsoft, 2016). Similarly, Google has rebuilt the entire third floor of its impressive, flashy Manhattan located headquarter into a playful, educational space where girls can experiment with the use of tech while discovering their interests and capabilities within the STEM field (Peters, 2018).

One could argue that the great (financial) attention, showed to girls in STEM, comes to shape the phenomenon as a highly sparkling and glitzy one. Thus, the phenomenon of girls in STEM can be said to have been sprinkled with large amounts of *glitter*, which, drawing on Coleman's (2020) theories, can be seen as an attempt to attract—and thus govern—the educational behaviour of girls towards STEM (see also Coleman, 2019). In her exploration of glitter, Coleman (2020) argues that glitter "transforms and make worlds" (p. 6), while it also fabulates "futures that are different to and *better* [our emphasis] than the past" (p. 7). As such, Coleman (2020) also suggests that glitter participates in the production of imagined, dazzling (future) worlds that girls will desire to live and take part in.

Coleman (2020) argues that glitter is shimmering materiality in the sense of being a "collection of small, reflective plastic fragments that come in different colours and shapes, reflecting light at various angles so that it sparkles" (p. 18). In that sense, the glitter presented in the examples above can be said to exist as an

extended version of Coleman's (2020) definition of glitter, namely a more symbolic form of glitter. Material—or more precisely visual—glitter can, however, also be found sprinkled upon the phenomenon of girls in STEM. This is seen from the shiny and flashy images that have come to surround the phenomenon through various campaigns. For instance, the EU funded campaign, *Science: It's a Girl Thing*, includes a video of three glamourous women dancing around in stylish (short) dresses and high heels, while experimenting with glitzy chemicals, allowing them to produce beauty products such as dazzling pink lipsticks and glossy, dripping nail polishes (EU, 2012). The three women are fooling around in a fancy lab where all kinds of games and fun experiments seem possible thereby portraying STEM as a place for exciting play with beauty and splendour (see Fig. 9.1).


Fig. 9.1 Screenshots from the video produced as part of the EU-funded campaign: Science: It's a Girl Thing

Presented under the slogan, *Change the world—stay in STEM*, another video, produced as part of a Microsoft campaign, also displays a range of glimmery aesthetics, including a group of neatly dressed young girls telling how they aspire to develop their STEM skills (Microsoft, 2017). Just as the video produced by the EU, the Microsoft video is shot in a fancy lab where all kinds of fun experiments seem possible. However, rather than focusing on play with make-up and beauty, the Microsoft video has a focus on the saving of lives and the role played by

STEM in saving planet Earth. As such, all three girls in the video tell how they desire to excel in STEM in order to save the planet and the climate; to find a cure for breast cancer; and to ensure clean drinking water for everybody (Microsoft, 2017) (see Fig. 9.2).


Fig. 9.2 Screenshots from one of the videos in Microsoft's #MakeWhatsNext campaign

The materialized form of glitter referred to by Coleman (2020) is also to be found when searching through the market for some of the many educational toys that have been produced to inspire more girls to explore and develop an interest in STEM. A quick Internet search on educational STEM toys for girls shows STEM play kits such as the *Sparkling Perfume Lab* (Youniverse n.d.) where "science meets style", and wherefrom girls can produce sparkly perfumes through chemical experiments, as well as a *Unicorn Science Set* (Playz n.d.) that girls can use to learn to blend and make "glowing in the dark slimes and crystals." In addition, the search shows educational STEM toys such as Mattel's different STEM Barbies [e.g., the STEM kit Barbie who specializes in designing and dying dresses as well as building shoe racks, where she can display her glittery diamond decorated shoes, but also the Science Barbie, the Computer Engineer Barbie, and the Astrophysicist Barbie] which contribute to the glittery image of girls in STEM, not only by owning creative STEM skills but also by wearing fancy, glimmery

garments, explicitly described by the designers behind the Barbies as “cute little outfit[s]” (Eckart, 2018) (see Fig. 9.3).


Fig. 9.3 Images of some of the educational STEM toys designed for girls

As seen from the examples above, public, and private actors alike take part in the production of a narrative describing educational leadership as efforts to make STEM appear attractive to young women. Thus, educational leaders are expected to channel the alluring narrative of how STEM competencies enable girls to create prettiness, save lives, and change the world. A range of different actors power this narrative by sprinkling it with glitter (see Coleman, 2019, 2020), making it appear not only self-evident and necessary but also fun, appealing, and as an obvious path towards progress and better futures. However, with all their glitter and glow, these narratives also invite critical scrutinizing. When educational leaders channel these narratives, what assumptions about gender, aspiration, and social mobility are implied? What possibilities of subjectivity are produced? What questions might be important for educational leaders to think about when engaging with the policy

focus of getting more young women to take an interest in STEM? The following sections aim to bring forward and qualify such questions, thus hopefully allowing educational leaders to consider the political implications of channelling the narrative.

**A Not so Glittery Experience: Entering a STEM Classroom**

The glittery image of STEM and the fairy tale narratives of beauty and the saving of life had formed the expectations with which one of the authors of this chapter entered a Danish primary school. Her aim was to understand what governs the interests and aspirations of young girls in a context of STEM. The visited school has actively worked to implement a STEM policy for more than 2 years, particularly focusing on how it could renew the school's STEM education to motivate more girls to engage with the field. The author was, thus, full of excitement for the illuminating shine and shimmering worlds that would meet her as she entered the school's biology classroom.

However, as the author entered the classroom, there was neither much shine nor shimmer to be found. On the contrary, the classroom was small, dark, and worn out; all furniture in the room was black; the old posters of detached body parts hanging on the walls were ragged and bleached from the sun, even though not much sun could enter the room due to very few windows; and the only – dirty – windows were facing an empty, grey parking lot, creating a bleak and gloomy atmosphere in the room.

The first thing that met the eye of the author when she entered the classroom was a group of taxidermies standing on the teacher's desk in the middle of the room. The preserved animals were staring straight out in the room. Some stared from upright, almost proud postures, others stared from awkward, forced positions that seemed unlikely to be found among animals vividly alive in their natural habitats. Most of

the preserved animals were birds in different sizes; large, medium, and small birds, all having their feet hammered onto scratched wooden plates in order to keep a fixed, balanced posture. There was, however, also a brown squirrel to be found in the small family of preserved animals, as well as a marten, showing of its pointy teeth with an aggressive expression.

The author felt a slight distress from the starring taxidermies as she crossed the classroom to take her seat on a stool placed in a dim, narrow corner in the back of the room. While walking towards her seat, the teacher called for a group of girls to help remove the preserved animals from the desk and bring them back to the shelves where they usually lived. One girl covered her hands with the sleeves of her shirt before lifting a greasy bird so she would not have to touch it. Another girl was cautiously making sure to only touch the little wooden plate, onto which a small bird had its feet hammered. As such, the girls seemed to demonstrate some form of repulsion and discomfort with the taxidermies, but paradoxically this negative affect also seemed to take momentary forms of attraction and excitement, since the girls also appeared to be rather fascinated with, for instance, the fake glass eyes of the birds.

The author sat down on her chair and got ready to do her observation notes as another group of dead animals, sharing the cramped corner with her, swiftly caught her eye. These animals had the same stare as the animals that had met the author as she entered the dark classroom. Some of the animals were staring in their natural appearance in colourful feathers [a male duck] or fur [a hare], others were staring from sealed glass jars, wherein their naked bodies lay drowned in preserving formaldehyde. The author felt a slight scare as she made eye contact with what seemed to be a dead mouse floating around in miscoloured liquid [maybe it was the jar, rather than the liquid being miscoloured, but the liquid looked slightly yellow]. However, she could not help but to share some of the

same fascination as the girls had expressed when she studied the many details of the little creature (see Fig. 9.4)

Fig. 9.4 Images of starring dead animals

One animal, in particular, attracted attention. This was a big black bird [a crow] pointing its beak towards the author. The bird's head seemed to have been twisted into a bizarre, tilted position. This unnatural position of the bird's head and the still staring eyes of the drowned mouse brought not only a sudden sadness but also a curious wonder to the author. She was hit by the fact that before living a (*dead* and manipulated) life in the classroom, the taxidermies had lived other and different lives in their natural habitats. Before living on a shelf, the crow had been flying free in the open air. Before having been violently stuffed in a cramped jar with miscoloured alcohol, the drowned mouse had been running free in nature on its now floating legs. Before having been hammered onto a wooden plate, the small bird had been singing in the trees. And before having been deadly shot, the marten – judging from its captured facial expression – could have been hunting down a prey for its upcoming dinner.

**Mirroring**

Now, the methodological question is which theoretical and methodological ideas that can help us unpack the intensity of this moment where contemporary vivid and glittered narratives of girls in STEM encounter old preserved animals. We begin in a methodological tradition of dwelling in small moments or encounters in an extensive fieldwork, which, in our case, included many days of fieldwork, field notes, more than 30 interviews, documents, and hundreds of photos taken by the researchers as well as by their informants. Under umbrella terms such as non-representational or post-qualitative research, scholars have left ideas about representation, and how the selection of citations or events in a dataset should be made with reference to how these represent the larger data set (e.g., Lather & St. Pierre 2013). Instead, scholars have argued for a manner of working with data where the researcher dwells in what may at first seem like a minor or fleeting occurrence (Kociatkiewicz & Kostera, 1999). Blackman calls it "small data" (2019a, b) and Lather (1993) speaks about doing more with less. To dwell in one particular encounter or moment involves work to carefully unpack the affective qualities of the moment, consider its textures, multiplicity, and layers, as well as to creatively assemble the traces, lines, or half-hidden stories that seem to encounter each other in such a moment (Bell & Vachhani, 2020; Edensor, 2008). Moreover, our methodology is indebted to work that emphasizes the ability of the researcher to be surprised and even enchanted with mundane things. As Bennett (2001, 2010) has argued, an enchantment with things in the everyday world, a feeling of surprise, and a state of wonder, can be a fruitful point of departure for new analytical inquiries (see also MacLure, 2013). Also, in work done under the umbrella term of New Materialism (Barad, 2013; Bell & Vachhani, 2020; Ford et al., 2017; Juelskjær, 2019), we find a methodological sensitivity to the agentic and vibrant forces of things or matter (see also Edensor, 2020). Thus, our methodology begins as a concern with particular, perhaps minor, moments that seem saturated

with meaning and intensity, although the researcher is at first not exactly sure why. Moreover, our point of departure is the importance of the ability of the researcher to be surprised, perhaps even enchanted or spooked, by the things she may meet in her research.

To become capable of sensing and evoking the hauntological forces working in the narratives on girls in STEM, we propose a methodological approach of *mirroring*. Objects or bodies in mirrors have a spectral character. They are both absent and present. Thus, mirrors seem suitable for hauntological endeavours and for tracing absent–presences. As we will elaborate on below, our idea of mirroring includes to allow two different empirical phenomena (glittery narratives on girls in STEM and preserved animals) to reflect on each other and to explore the tensions, images, visions, and apparitions that might emerge in the reflections.

Mirrors and ghosts have a long-standing relationship. The mirror is often what allows people to get a rare glimpse of the ghost. In popular culture, the scene is well known, where a mirror shows at first a person's own reflection, but then also another figure behind the first figure. The affective anxiety that emerges in this scene arises from the question of whether the figure in the mirror is there or not. The extra figure is an absent–presence. This is close to Derrida's (1994) ideas about hauntology, when, in *Spectres of Marx The State of the Debt, the Work of Mourning and the New International*, he plays with the sound of the word ontology and replaces it with hauntology. The concept of hauntology emphasizes the impossibility of fixed meanings and significations and brings to the fore an "experience of the non-present, of the non-living present in the living present, of that which lives on" (Derrida, 1999: 254). The mirror is for us the scene where absent–presences can be seen, although their existence is contested. We draw on Derrida to think about absent–presence as something which perhaps used to but no longer has a place in discourse and knowledge. Derrida writes:

> One does not know what it [the spectre] is, what it is presently. It is something that one does not know, precisely, and one does not know if precisely it is, if it exists, if it responds to a name and corresponds to an essence does not know: not out of ignorance, but because this non-object, this non-present present, this being-there of an absent or departed one no longer belongs to knowledge. (Derrida, 1994: 5)

This absent–presence, this paradoxical being-there of what should have departed or been expelled, is something that perhaps used to but no longer belongs to a system of knowledge. The ghost brings with it a message from a space outside of discourse and representation (Pors, 2016a). From a methodological perspective, the mirror, or the practice of mirroring, is a way to catch a glimpse of that which no longer counts as knowledge and has been erased from present discourses. When we mirror glittery narratives on girls in STEM in preserved animals, it is these other figures, these absent–presences that may emerge in the mirror, we aim to tease or lure out of our empirical material.

Mirroring is a methodology that builds on the idea that one way of luring out certain realities not immediately visible, is to work to make the well-known and taken for granted appear strange and disturbing (Beyes & Steyaert, 2013; Pors, 2016). It is a methodology that seeks to disrupt the normalized affordances of discourses, i.e., how they enable and constrain *taken-for-granted* modes of action and practice (Holloway & Kneale, 2008). We suggest mirroring glittery policy narratives of girls in STEM in preserved animals as a way of making strange the discourse about women in STEM, so that its usual manner of guiding behaviour, leadership, and decision-making can be troubled. However, before we can mirror the narratives in the preserved animals, we will explore more deeply what a preserved animal is, the practices through which it has come into being, and the histories to which it is entangled. This is a methodological move of making the

preserved animals as rich as possible as a mirror for the glittery narratives. Here, we build on the perhaps speculative idea that affects, atmosphere, events or practices leave traces or are stored in materiality. As Philippopoulos-Mihalopoulos (2013: 40) phrases it:

> The glass is hit by birds and becomes weaker with every crash – the matter remembers, the idea of affect becomes inscribed in the affected body. The body bears on its surface the historicity of affects.

This is the idea that affective traces of meaning are stored in surfaces and materials. In his work with what he calls *spectral ethnography*, Armstrong (2010) suggests viewing objects and spaces as collections of accumulated and layered affective and cultural meaning. He argues that ethnographic attention should be directed to how layers of meaning, affect, stories, and practices accumulate in things, buildings, or landscapes. Armstrong suggests that while left to themselves, slowly fading from collective memory, buildings, things, or landscapes may continue to release resonances of the practices, stories, and emotions that have over time imprinted themselves in them. Armstrong writes that resonances are "not distinct or separate, but they overlap and converge in constellations of beauty, sadness, and memory" (Armstrong, 2010: 249). These resonances may no longer be easily available. Often, they have been expelled from official self-representations, yet their meaning might be drawn out from the researcher's subjective and reflexive interactions with them. Also, in the case of digital data, Blackman (2019a: xiii) has proposed that things bear the traces of the human, material, technical, symbolic, and imaginary histories that are often displaced and occluded from their present surface or appearance. Histories may linger in materiality, be it bricks, walls, bodies, or things, and remain there as absent presences. They are not immediately visible or present, but such histories are not entirely absent either. They remain as ghostly traces, as absent–presences.

However, to poach them and lure them into our analysis, a particular methodological approach is needed in which the researcher considers the possible multiple histories to which a thing may be entangled. This is an explorative and speculative endeavour where many different threads, lines, links, and intuitions can be followed, some leading to dead-ends (Blackman 2019a, 2019b), and others proving to be helpful for the analysis. In a hauntological fashion, the aim is to bring out those relations, entanglements, and histories, whose ontology is questionable. It is not the case that they are simply there, but they may not be entirely absent either—they are not present, yet they somehow exist.

## Exploring the Histories Lingering in Taxidermies

In the following, we explore taxidermy as a material, immaterial, and epistemological practice, and we analyze the colonial histories that might linger in such practices. Other lines of inquiry could of course have been explored and indeed were explored as part of our initial analytical engagement with the material. We chose to focus on these specific taxidermic practices because they can help us to explore which assumptions about aspirations, motivation, and knowledge are at work in the studied glittery narratives on girls in STEM.

### *Conservation Practices: Bringing Life to the Dead*

To understand the life of the animals in the biology classroom, one of us made a visit to a taxidermist specializing in giving dead birds an eternal life as preserved animals. When arriving at the taxidermist, the author was first walked through a showroom wherein a group of chosen birds were showcased for customers to inspect [she was later shown how a large group of failed animals, not reflecting natural life enough to be worthy of showcasing in the shop, were piled and hidden away in the basement under the shop where they lived a life in darkness], before entering the surgical workshop where lifeless animals were brought back from the dead. The author was placed at the end of a newspaper-covered table where the

taxidermist had already started skinning a sparrow hawk for the author to follow the process of breathing life into a dead animal from beginning to end. The instruments used for skinning resembled instruments used for human surgery as well as more morbid tools originally designed for carpentry use and building work (see Fig. 9.5).

Fig. 9.5 Images of one of the failed animals, as well as of some of the taxidermic practices, including a newly painted beak of a seagull

From the skinning of the bird, it was clear that bringing life to a dead animal is indeed a practical and material act. The taxidermist showed the author how the skin of the lifeless animal is first removed from its little frozen body [the author was told that the animal is handed in warm and freshly dead and is then frozen down until the preservation process begins. Thus, the preservation process starts with a thawed animal] before being moulded onto a reconstructed body, cut and crafted from soft balsawood. As such, the author watched how a sharp scalpel was used to gently release the shiny feather splendour from the sparrow hawk's fleshy body. She watched how the shiny feather splendour was carefully powdered with sawdust from the inside to absorb the many greasy juices that continue to be released from the skin even after death has entered. She observed how the feather splendour was carefully and neatly wrapped around the balsawood body, and how

the bird physically arose—like a balloon being inflated—as the gaps between the balsawood body and the feather splendour were filled with acrylic foam, sprayed into the emptied body with an iron syringe. Finally, she watched how the bird had hard steel wires pressed up through its feet before being hammered and stabilized onto a stump of wood.

As the author only had one day available for visiting the taxidermist, and the process of preserving an animal is long, the taxidermist guided her through the last parts of the preservation process verbally. The taxidermist told the author how the final part of the preservation process, called *finishing*, involves the bird going through a careful grooming procedure, where it is *glittered* and make-upped back to natural life. As such, the final part of the preservation process entails that the bird's feathers are softly blow-dried and brushed, and its beak and feet diligently airbrushed with the bright and shimmering colours that slowly fade into grey when death occurs and blood stops nurturing the now blackish limbs of the bird.

During the preservation process, the author did not only observe how bringing life to dead animals is a practical material act, she also observed how it is indeed an immaterial act of bringing character and hence personality to the life of the animal. As she watched the taxidermist slowly revive the sparrow hawk, she thus observed how new life was given to the animal through the taxidermist's own preferences and interpretations of nature. As such, the skinned body of the dead animal constituted a mouldable surface on which all kinds of expressions and characteristics could be inscribed by the taxidermist (see e.g., Aloi (2018) for a historical description of taxidermic practices).

Comparing dead animals to music, the taxidermist told the author the following about how he, as some kind of *God*, gave life to dead animals by installing a

particular "personality" in the taxidermies, despite having a philosophy of letting nature govern the life of the animals by itself:

> It's the same with music, there's a heck of a difference in how it's interpreted. When you play a piece of music by a specific composer there is a set of notes and it's fixed how it should be played, but you can't help but creating your own version of it. Different musicians will play different versions of the same piece of music because you put your own personality into it […] I look at something dead and then I have to play God and make them [the dead animals] look alive. I impose my own personality on them. I force the skin where I want it instead of following nature. But my ego can't dominate nature, I can't make my own version of them, that's actually a no go in my own book.

From the words of the taxidermist, it can be seen how the new life lived by taxidermies is shaped by the choices made by its creator, namely the taxidermist. As such, the new life lived by taxidermies depends on how the taxidermist "force[s] the skin" onto the crafted balsawood body, and the bright colours, (s)he uses to paint the animal's bloodless limbs, rather than on some natural given law. In giving life to a dead animal, a distinction between natural and unnatural is, thus, constantly navigated by the taxidermist.

To emphasize his point of how nature should always govern the preservation process, the taxidermist showed the author a range of different American magazines for *Wildlife Artists* – a synonym used for taxidermist, mainly in a US context. Scrolling through the magazines, the taxidermist repeatedly rolled his eyes to signal his disapproval of how the preserved animals on display in the magazines were too artistic, too anthropocentric, and thus, unnatural. A case in point was a zebra with its head placed on some kind of triangular pedestal, which,

in prolongation of the head, had also been artistically wrapped in striped, zebra skin. Bringing the case into a context of his own preservation practices, the taxidermist told how he had recently had some correspondence with a customer requesting the head of a barn owl to be tilted in a very particular way. The taxidermist had been opposing the customer request as he believed that the tilted head went against the owl's posture in nature: "…it is able to do that, but it's very much a specific moment captured in time, it's not a common and natural posture of the owl." Indeed, the taxidermist spent many hours every week studying birds in their natural habitats to get not only valuable information but also an intuitive understanding of their movements, expressions, and lives.

Thus, the visit to the taxidermist offers valuable insights into the difficult navigation of distinctions between natural and artificial. Bringing vivid life back to dead animals is a practical and material act of *glittering* up the animals to look shiny and beautiful, but also an immaterial act of investing personal choices, preferences, and spirit in the animals. Perhaps, these tensions and intuitions may help us to better understand current narratives about girls in STEM. But before we turn to such explorations, we investigate entanglements of taxidermies and particular epistemological and colonial practices.

***Possible Histories of Taxidermy***

Taxidermy is entangled in conditions of knowledge production in the biological sciences. Still today, taxonomic systems and thus the possibilities of identifying, documenting, counting, and studying an animal, plant, or fungus rely on the so-called primary type specimens (more precisely, a holotype). A primary specimen is kept and stored in a collection somewhere in the world and serves as the objective standard of reference for the identification and naming of species. In many cases, one single specimen serves as the scientific name-bearing representative for any animal, plant, or fungus species. Thus, the practices of

preserving and preparing a specimen to last forever and function as a standard reference are key to many biological sciences. Indeed, possibilities of knowing, studying, sharing, accumulating, and advancing knowledge, are entangled to the practicalities of conserving the precious primary type specimens. If a particular holotype specimen is lost, biological knowledge no longer has the reference from which to determine the species of an animal, plant, or fungus. Thus, it is of great importance that the particular specimen is preserved adequately and is stored and maintained in the correct manners. Even if this happens less nowadays where many type specimens are available digitally as images and extensive descriptions, specimens travel around the world to help scientific projects in their determination of questions about species. For present purposes, what we want to highlight is how taxidermy is entangled with particular practices of knowing and producing knowledge. It is entangled to the classification system proposed by the Swedish botanist Carl Linn in the eighteenth century, in which all life on earth can be positioned in a specific place in the tree of life. All life can be ordered and organized, i.e., placed in proximity to similar species by help of categories of kingdom, classes, orders, family, genus, and species. Taxidermy is the practice that keeps knowledge in place. It is what ensures the stability of human determination of species.

Many scholars have demonstrated and discussed how the mastery of biological knowledge, the taxonomic systems, and the practices of naming and cataloguing were (and still are) a core political foundation of colonial regimes (Das & Loew 2018; Richards, 1993). The practices of collecting and preserving animals have a long history in which scientific and political forces are difficult to disentangle. As many scholars have argued, the scientific efforts to find and collect animals and plants in the eighteenth, nineteenth, and twentieth centuries, were part and parcel of colonial practices of conquering territories and building empires (Richards,

1993; Stoler, 2009). Species were removed from biodiversity-rich regions in the global south and transported to imperial centres in the north where they were carefully preserved and utilized to build prestigious collections in the Natural History Museum or Kew Gardens in London or in the Smithsonian National Museum of Natural History in Washington. Controversy and anxiety surround questions about whether, today, type specimens should be sent back to the regions where they were found (often global south), or whether they are *best kept* in the grand museum collections in the global north (Antonelli, 2020).

As Richards (1993) has argued in the case of the Victorian archive, the production of knowledge can be seen as an apparatus for controlling territory by producing, distributing, and consuming information about it. For example, practices of classification and cataloguing served empires in transforming blank spaces on maps into colonial societies (that blankness itself being a violent and powerful force, making it possible to ignore the people already inhabiting that space as well as the knowledge and relationships they had to animals and the ecosystems in which they lived) (Richards, 1993: 17). Practices of collecting facts and material specimens, of archiving, cataloguing, and counting, were all considered key to solve the colonial problem of how to govern at a distance (Richards, 1993: 6). And, indeed, colonial administrations were prolific producers of categories (Stoler, 2009: 3). As Richards (1993: 5) has argued, the production of knowledge should not be understood as a supplement of power, but as its replacement in the colonial world.

Thus, when considering, perhaps speculative, questions about what might linger or is somehow stored in preserved animals, we will propose that taxidermy has a history with particular entanglements to a manner of knowing and of producing knowledge that rests on particular practices of naming, classifying, and

cataloguing. This is a practice that includes the idea that knowledge production depends on the reliability and stability of standards (Bowker, 2008).

Moreover, we suggest that there is a – perhaps half-forgotten, yet lingering – relationship between taxidermy and colonial histories of ambitions to master the world. Although not immediately visible today, the history of taxidermy includes relations to colonial expeditions to *uncivilised* (sic) worlds, where specimens were collected, removed from the regions in which they were found, and brought back to imperial centres and collections, where they could come on display and excite western audiences with their *exotic* and *foreign* charisma. Even if these may be elusive and, indeed, are not linear or causal, practices of taxidermy have links back to colonial urges to catalogue the world in order to know it; and know it in order to master it.

These explorations about the histories lingering in taxidermies should not be read as an explanation of the affective reaction of the girls in the STEM classroom. We are not arguing that these histories are simply solidly present and available to whomever walks by preserved animals. Instead, we propose that taxidermic practices, affective forces, and histories are both there and not there. What we are suggesting is a methodological approach of following and evoking certain histories with the specific methodological purpose of exploring contemporary narratives aiming to attract more girls to STEM educations and careers. In coining the term hauntology, Derrida (1994: 63) emphasized that hauntologies are performative methodologies. They are interpretations that transform the thing they interpret. The approach we suggest is a performative act of conjuring the forces or histories that, on the one hand, are no longer immediately available to us, but, on the other hand, are not dead, departed or without agency either. We evoke these half-hidden, half-forgotten, affective histories with the specific purpose of exploring assumptions about aspiration, motivation, knowledge, and gender in

current glittery narratives. The aim is to bring out and put in motion other stories than those the field tells about itself. In our case, other stories than the glittery narrative about a lack of women in STEM and what to do about it. Although highly subjective and reflexive – indeed a result of the particular staging we perform when mirroring current policy narratives on girls in STEM in preserved animals – our suggestion is that this method offers one way of getting into contact with the half-hidden forces and assumptions that also constitute current truths about STEM, aspirations, and women. Having explored taxidermy and its histories, we can now re-consider contemporary, glittery policy narratives, and perhaps catch a glimpse of another figure than the one first observed. In the following section, we demonstrate what sort of analytical questions and lines, the methodological approach we have described could make possible.

**STEM Narratives Mirrored in Taxidermy**

When we first observed an encounter between preserved animals and glittery leadership narratives about how to get more women into STEM educations and careers, we saw a clash between two very different worlds. The glittery narratives seemed to clash with the dusty and decaying preserved animals found in the STEM classroom. Whereas the narratives portray natural sciences as clean, futuristic, bright, beautiful, and glittery practices, the preserved animals associate natural science with a dusty, long-gone past. And whereas the narratives associate natural sciences with large, light, shiny, and expensive laboratories, the preserved animals can be associated with local, murky classrooms, where not so wealthy schools rely on outdated artefacts in the teaching of natural sciences. Also, whereas in the narratives, natural science is carefully related to present life of young girls assumingly consisting of make-up practices, perfume, fashion design, etc., the preserved animals do not really belong in anyone's life anymore – even in a teaching situation, they are almost no longer needed and have indeed become

superfluous beings hidden on shelves. However, if we mirror the glittery narratives in the mirror consisting of some of the half-forgotten practices and histories that may linger in the preserved animals, what could we find? In the following, we will try to catch a glimpse of other and more ghostly figures that might also emerge in the mirror.

When we consider the material taxidermic practices of carefully powdering dead fleshy bodies with sawdust to absorb greasy juices released from their skin or of putting shiny lipstick on faded beaks, we catch a glimpse of certain similarities between the world of glittery policy narratives and preserved animals. Although, at first sight, the two worlds seem opposing, they also share a normative valuation for the beautiful, for the aesthetic, and for making surfaces and skin look pretty. The STEM narrative aims to inspire girls to develop STEM aspirations by showcasing how science can be utilized in fashion or to produce make-up or perfume. This may open analytical questions about how it is beauty and aesthetics that are meant to inspire STEM aspirations in girls and young women. It seems that an urge for normative beauty and practices of making things pretty are the affective lines through which girls and young women are invited to be attracted to STEM. STEM aspirations are supposed to grow out of an affective urge to produce beauty and work on bodies – perhaps even one's own body – to become more beautiful. Thus, the first possible line of inquiry, emerging from our suggested mirroring approach, is to ask questions about the assumption built into the glittery narrative about how motivation emerges from and can be activated by desires to be normatively beautiful. How and with what effects may glittery narratives assume that motivation can be inspired by speaking to desires to make or be beautiful?

There is also another set of underlying assumptions that we can start to bring out by considering similarities between the STEM narrative and taxidermy.

Taxidermy is the art of using artificial skeletons, carefully crafted balsawood bodies, as well as acrylic foam, to shape dead bodies so that they appear natural and alive. Moreover, it is portrayed, at least by the taxidermist we visited, as an art of breathing life into a dead body, behaving God-like, and offering some of your own personality and spirit to the dead body. There is a balancing act that needs to be mastered by the taxidermist, namely, the act of finding the right position and expression of the preserved animal, so that it presents itself with some personality without appearing overly staged and hence unnatural. Thus, some finetuned mastery of humans over animals may linger in taxidermies; a mastery of humans over life; as well as a mastery of humans over the fine lines between the natural and unnatural (Patchett, 2017; Searle, 2021). Mirroring glittery STEM narratives in such lingering forces may be a way to consider how the narratives are built on the assumption that motivation comes from a desire to master life and death as well as a longing to master the fine lines between what gets to count as natural and unnatural. The narratives often emphasize how entering STEM will allow girls to invent new technology to develop vaccines or other important medicine. While we by no means want to argue that these would not be admirable reasons to enter STEM, it is also a particular capturing of motivation. The narratives seem to assume that motivation can be inspired by speaking to noble but also grand ambitions of wanting to master life and death. When the narratives portray scientific knowledge practices, they portray a specific relationship between the human subject and the natural world, where the latter is an object of human investigation and intervention. The human subject is active, knowledgeable, and interventionist, and the natural world is somewhat passive or useless until the human subject does something to it (for a critique of such an assumption see Bennett, 2010). Thus, we can also ask questions about how and with what possible consequences the narratives are built on the assumption that motivation springs from a desire to master life and death.

Finally, we suggested that taxidermy is entangled to practices of naming, classifying, and ordering animals, in accordance with taxonomic systems and established standards. We also proposed that taxidermy has a history that is linked to colonial practices of governing by forcing particular western knowledge systems upon indigenous societies. Observed in this mirror, an image emerges in which it becomes visible and apprehensible how the STEM narrative aims to inspire aspirations through an urge to order and master life. One can start to wonder about why it does not seem to be an unruly, unknowable nature or vibrant life that are meant to inspire STEM aspirations. It is not necessarily the yet unknown mysteries of life on our planet, but a particular manner of mastering the natural world and bringing it to use for specific human purposes, that is believed to inspire aspirations. Many of the narratives introduced above offer girls a prefabricated and well-described script for how to encounter and interact with the natural world. For example, the STEM toys explain how, if mastered the right way, certain chemicals can be used to design and dye clothes or create make-up or perfume. How and why and with what implications is this a particular instrumental approach to chemicals or biological life that is meant to motivate? It is not so much the mysteries of the natural world that are meant to inspire aspirations but the instrumental use of e.g., the certain qualities of certain chemicals that allow people to develop make-up products. The campaigns portray knowledge and knowledge practices not so much as efforts to wonder and marvel at the mysteries and capacities of the natural world, but as instrumental practices of bringing things to use for certain limited purposes. Thus, there might also be a set of questions to be explored around how and with what possible consequences the narratives assume scientific knowledge and knowledge practices to be about bringing to use and making knowledge instrumental, rather than e.g., exploring and dwelling in mysteries or unsolved questions.

Which questions about current STEM policies do the above considerations prompt? Should educational leaders work to implement such policies, and, if so, how? While it is easy to share the concern of the STEM initiatives of creating equal possibilities for all children and young people to become interested in STEM, we hope to have also spurred reflections in the reader about the underlying assumptions about gender, aspiration, and the knowledge (un)resting in these initiatives. Although the STEM narrative affectively touches and moves us with its glittery visions about the future success of girls and young women, we hope to have opened a space for educational leaders in which to think about how the narrative may also enforce stereotypical gender roles by focusing on *pinky* matters such as make-up and perfumes and by portraying girls with an interest in STEM as being attracted to fancy garments and cute little outfits. When the campaigns aim to inspire aspiration and produce motivation, could it be that they decrease rather than increase possibilities of being inspired and becoming motivated? Could it be that it is a very particular and limited affective and discursive grid that structures possibilities of aspiration and motivation in the campaigns? What kind of girl do the campaigns make it possible for children to be? These are the sort of questions that we propose critical educational leadership should consider.

In the ghostly mirror that we have created by speculating about taxidermies, it has become possible to consider whether the invitation to become motivated, offered by the STEM narratives, runs along somewhat limited affective lines of desiring to be beautiful or making surfaces look beautiful. In the campaigns, becoming interested in and developing aspirations for STEM, seems mostly possible via desires for normative beauty. Thus, educational leaders may want to consider if there are manners of inspiring STEM aspirations that work through a broader plurality of different lines through which to be attracted to STEM.

Also, our speculations may open a set of considerations about the assumptions that work in the STEM narrative, concerning the relationships between humans and non-humans. What ideas about the human as the active, knowledgeable, and interventionist subject, and the non-human as passive or inert matter, are channelled through these campaigns? How are STEM aspirations sought inspired through a view of matter (e.g., chemicals or minerals) as an instrument available to human? What kind of natural scientific thinking and practice becomes possible when aspiration is inspired through desires to master, to follow a planned script, and to assume that things around us are inert and passive until humans find ways to exploit them? How would attempts to inspire STEM aspirations look like if they were built on ideas about plants, animals, and chemicals as lively and vibrant matter (Bennett, 2010)? In times in which human activity is destroying the planet, might it be possible to develop a more eco-sensitive manner of inspiring STEM aspiration in young women? What consequences could it have for our futures that STEM aspirations are sought incited through desires to master life and death?

It is our hope that an ongoing conversation about a lack of women in STEM, and what educational leaders should do about it, can be enriched by such reflections.

**Conclusion**

In this chapter, we began in one ethnographic moment where a glittery narrative, emphasising the importance of inspiring girls and young women to develop aspirations in STEM educations and careers, encountered some dusty, preserved animals. We wondered whether this moment might enable us to ask new questions in our study of these narratives, particularly in relation to our interest in the assumptions about aspirations, motivation, gender, and knowledge, on which these narratives rest. Drawing on Derrida's notion of hauntology, we have suggested a methodological approach, a process of ghostly mirroring, through which one can explore the histories and affective anxieties that may linger in certain spaces,

scenes, or objects. In our case, we explored preserved animals and lured out the half-hidden histories, epistemological categories, and colonial violence, to which they are entangled. Thereafter, we turned the preserved animals into a mirror in which new aspects, questions, or concerns about the glittery policy narratives may appear.

Our methodology builds on work that has encouraged analytical dwelling in minor moments that seem to hold the capacity to make it possible to reconsider or tell other stories than the ones particular narratives tell about themselves (Blackman 2019a, 2019b). Moreover, we are indebted to work that emphasizes the ability of the researcher to be surprised or enchanted by the objects she may meet (Bennett, 2010; MacLure, 2013). It could easily be argued that preserved animals are in no manner central to a study of glittery narratives on girls in STEM and the assumptions about gender they appear to rely on. However, taking an experimental, or even speculative route, we have tried to demonstrate that we can learn something about the current narratives by mirroring them in preserved animals. To do this – to make preserved animals a rich mirror for current STEM narratives – we have considered in some detail the histories that might linger in preserved animals. We have visited a world leading taxidermist to learn about the practices and arts of preserving dead animals. Furthermore, we have considered the epistemological practices as well as the colonial histories to which preserved animals might be entangled. The aim of this was to bring out and put in motion other stories than those the field tells about itself. In our case, the other stories were the policy narrative about a lack of women in STEM and what to do about it. Although highly subjective and reflexive – indeed a result of the particular staging, we perform when mirroring STEM narratives in preserved animals – our suggestion is that this methodology offers one way of getting into contact with the

half-hidden forces and assumptions that also constitute current truths about STEM, aspirations, and women.

With these explorations, we hope to raise a set of questions for critical educational leaders. If one shares with the STEM policies and campaigns a concern about equal opportunities for all children to develop interests and aspirations, then how could educational leaders work towards equality without installing very particular and narrow patterns of aspiration? How may one inspire STEM aspirations without simultaneously producing a rather limited affective and discursive grid structuring possibilities of aspiration and motivation? How can leaders work to inspire aspirations without limiting the possibilities of gender subjectivity of children and young people? What would leadership initiatives look like if they did not only assume diversity to be a matter of getting more women into STEM careers by convincing them that STEM is about making beauty and mastering life, but also worked to make new and different knowledge and curiosity practices possible?

Ghostly mirroring, we find, is a process that is more helpful for purposes of bringing forward new questions than for analyses aiming to end in specific answers. It can perhaps be described as a particular *care for questions*. It is a manner of engaging with empirical material where open questions are appreciated, cared for, animated, and allowed to put other questions in motion. To care for questions is not aiming to resolve or settle doubts or ambivalences but to be able to accommodate, even amplify, the complexity, contradictions, and uncertainty of the material one is working with. This is a manner of engaging with empirical material where one is very attentive to the questions that empirical material often generously offers to us (MacLure, 2013). It is a manner of approaching a given material that seeks to keep open and alive questions, rather than settling with certain answers (see Karlsen, 2018). We recall here Walter Benjamin's approach

to reading Kafka, described by Richter (2016: 18; see also Karlsen, 2018: 56) as a process of "allowing oneself to be led ever more deeply into a problem rather than wishing to be guided out of it." Ghostly mirroring is a process that should work to problematize, to make that which is questioned even stranger, make it something that triggers new questions.

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**6.2.1 Post Thoughts |** This article was the first article of the thesis. This also means that my – and our – work has developed since the article was written, and that we are currently working on a new version that has replaced the mirror metaphor with Barad's concept of diffraction (1996, 2007). As such, I am aware that it can seem incoherent to focus on mirroring and reflection in the article, while arguing for diffraction and diffractive readings in the rest of the thesis. Indeed, Barad (2007) explicitly distances their work from the phenomenon of reflection (see e.g., p. 89-90). I still think that the mirror metaphor has allowed for us to play out interesting questions and wonders, but I see the inconsistencies that can be found in aligning this metaphor with Barad's (1996, 2007) work. However, this is a result of mine – and our – work progressing, and me – and us – having gotten new insights.

Further, it can be seen how my work on glitter has developed, and how I have moved away from a focus on 'symbolic' glitter and toward the material/discursive concept of glitter. Again, this is a natural consequence of my work progressing and me continuously getting more knowledgeable about the things, I work with.

Hence, this article is an example of how work continuously progresses, and how new knowledge and insights continue to qualify one's work.

**6.3 Article 3 |** Affect and aspiration in the STEM classroom – Exploring young girls' STEM (dis)interests (Sandager & Ravn)

This paper is currently under review in *British Journal of Sociology of Education*

**Title: Affect and aspiration in the STEM classroom – Exploring young girls' STEM (dis)interests**


## Abstract

This article explores affective dimensions of young girls' STEM aspiration formation, both conceptually and empirically. We draw on Sara Ahmed's feminist work in shedding light on the discursive and 'sticky' aspects of affects that become attached to STEM student subject positions, in constituting these as either affectively attractive or unattractive for girls to adopt. As such, we analyse (1) how students perceive of STEM subjects, and (2) the affects that these perceptions generate in and amongst students. Our findings show that positive affects are felt by and attached to students with STEM interests and skills, and that the opposite is the case for students that do not have such interests and skills. However, forming future educational STEM aspirations is not a straightforward affective process, and for most girls there is some form of trade-off between positive and negative felt and shared affect in forming their future educational STEM aspirations.



**Keywords:** affect, Ahmed, aspirations, girls, qualitative research, STEM

## Introduction

The lack of girls and women interested in careers in STEM (Science, Technology, Engineering & Mathematics) has been voiced as a problem internationally for decades (Smith 2010). In Denmark, as in other national contexts, this has been presented as both a practical problem – part of an overall lack of STEM candidates which will cause bottleneck problems in the labour market (EIGE, n/a) – as well as an equity or social justice problem (Puggaard & Bækgaard 2016; Francis et al., 2017). In response to this, a number of initiatives, strategies, and campaigns have been launched to improve the uptake of STEM subjects amongst girls and women, from primary school through to higher education, though seemingly without great effect thus far (Smith, 2010).

A large body of research has explored reasons for why girls and young women do not pursue STEM careers. Sociological research in this vein has focused on gender norms and 'intelligible' gender identities (Butler, 1990) and repeatedly, across countries and school level, demonstrated the various ways in which science broadly speaking is perceived as 'masculine' and 'ungirly' and therefore as something that challenges the identity as a 'proper girl' (see for instance Archer et al., 2012, 2013; Francis, 200l; Renold 2001). Being interested in science therefore requires a significant amount of identity work to still be perceived as 'feminine' – although not too feminine (Francis et al., 2017; Tan et al., 2013; see also Watermeyer, 2012). Mirroring research on educational aspirations more generally, sociologists have also identified how other structural and or socio-cultural components inform students' formation of aspirations in STEM subjects (e.g., Moulton et al., 2015; Ljungreen & Orupabo, 2020; Bozzetti, 2018; Albertini et al., 2019; Grim et al., 2019; Stahl, 2014). For instance, Archer & DeWitt (2015) found that primary school girls with an interest in STEM more often have middle-class backgrounds and/or high levels of cultural capital (see also Archer et al., 2012),

meaning that for girls from lower social class backgrounds it may not 'only' be their gender but also their social background that deter them from pursing futures in STEM fields. Further, students from ethnic minority backgrounds are also less likely to choose STEM subjects (Francis et al., 2017; Tan et al., 2013).

What has been devoted less attention from sociologists of education is what happens inside the STEM classroom. This line of research is dominated by other disciplines such as curriculum studies, didactics, and educational psychology, and is concerned with which forms of science education are more successful in terms of making girls more interested in science. Some suggest essentialist solutions such as 'a curriculum that has a strong affective component and relevant topics that addresses girls' concerns, such as saving the Earth and helping animals and people, is another way to enhance girls' interest in science' (Baker 2013, p. 16), while others have explored the benefits of context-based learning and argue that this approach – where learning takes its point of departure in real world problems – is effective in stimulating (girl) students' interest in STEM subjects (Broman et al., 2020; Busch, 2004; Troelsen & Sølberg, 2008). What sociologists have explored is how girls are more likely to underestimate their skills or competencies and not see themselves as 'clever enough' (see e.g., Francis et al. 2017; Archer & DeWitt 2015) and in that way disqualify themselves from pursuing STEM interests. The focus on being 'clever' is closely related to common perceptions of STEM subjects as 'difficult' subjects. In Archer & DeWitt's (2015) study, primary school students described STEM subjects as for the 'clever' students, and this was both why some girls were deterred from pursuing and others were keen on STEM subjects. As we return to in the analysis, this is also playing out in our data.

In this paper we take a sociological approach to STEM education in the classroom by focusing on how schoolgirls perceive of and orientate themselves towards STEM subjects. More specifically, we are interested in the affective dimensions

and consequences of how STEM subjects are taught in one specific, Danish school. Affect has largely been left out of existing, sociological studies into young people and STEM education, despite its popularity elsewhere (e.g., Clough, 2007; Gregg & Seigworth, 2010). We acknowledge that some studies focus on the 'affective domain of learning' (Broman et al., 2020) and characterise interests and attitudes as affective constructs (Broman et al., 2020; Osborne et al., 2003). However, much of this departs from psychological understandings of learning and affect (see Alsop & Watts, 2003). Our focus is somewhat different: while we first explore how students perceive of STEM subjects, we also explore the affects that these perceptions of STEM generate in and among the students. Hence, in this paper we ask how girls perceive of and affectively react to STEM subjects, and which role these affective reactions play in the formation of girls' future STEM aspirations. We focus on young girls in grade 8 in a Danish school, as studies have shown how educational interests and post-16 choices are often shaped very early on (Osborne et al., 2003; DEA, 2020). Before we turn to this, we introduce the framework and concepts guiding the analysis.

**Affect and aspirations**

To analyse how future educational STEM aspirations are directed and formed among girls, we find our inspiration in the literature on *affective governmentality*, which has largely grown over the last decade (e.g., Pentz et al., 2017; Ashworth, 2017; Kantola, et al., 2019; Author A, 2021; see also Dar & Ibrahim, 2019). The concept builds on Foucault's original work of governmentality (1991, 2009, 2010) but adds a dimension of affect to this. As such, the concept of affective governmentality emphasises that not only discourse, but also affect plays a role in subject formation, and that discourse and affects should be seen as mutually constitutive in processes of subjectification.

In analysing the role played by discourse/affect in a context of future educational STEM aspirations, we find our primary inspiration in the feminist work of Ahmed (2004b, 2004b, 2010), and more specifically her concept of *stickiness* (2004a, p. 120). While some affect scholars consider emotions as discursively 'arrested' affect (Staunæs, 2011, p. 233) and thereby as different from affect (e.g., Massumi, 2002; Thrift, 2000, 2004), Ahmed (2004a, 2004b, 2010) suggests that discourse and affect should not be seen as parallel or independently acting phenomena. Rather, the two phenomena must be seen as acting in and through each other in co-constitutively forming e.g., subjectivity, while it is also futile to distinguish between affect and emotion (Ahmed, 2004a, 2004b; see also Hemmings, 2005; Wetherell, 2011). Ahmed (2004a, 2004b, 2010) aligns affect and emotion based on the fact that the body will always already interpret affective states based on discursively categorised experience; for example, from prior experience, the body already knows that the affective state it reaches when it watches a goal being scored by its own team at the football stadium is thrill and not sorrow, just like it knows that the affective state it reaches when the opposite team scores is annoyance and not joy (Ahmed, 2010). Hence, discourse is vital for how we relate to and understand bodily affective states and thus for how we emotionally respond to the different world(s) surrounding us (Ahmed, 2004a, 2004b, 2010). In this paper we therefore work with affect and emotion interchangeably.

According to Ahmed (2004a), 'emotions are not a private matter, that […] simply belong to individuals' (p. 117). Emotions are not psychological properties that positively reside within singular, separated bodies, nor do they 'come from within and then move outward towards others' (Ahmed, 2004a, p. 117). Instead, Ahmed (2004a, 2010) argues that emotions are a shared matter that not only move singular bodies but also move between bodies in creating common (affective) understandings of the world(s) that they navigate. Further, emotions operate in a

'sticky' manner or have a 'sticky' character, making them stick to certain (collective) bodies, thereby constituting these bodies as specific affective subjects, evoking particular emotions among other subjects (Ahmed, 2004a, p. 120). This happens through discursive processes where emotions get attached to objects or bodies. Ahmed uses the example of the British asylum seeker debate to demonstrate how the circulation of a range of words spoken about the asylum seeker in the UK between April and June 2000, such as 'flood' and 'swamped' created an illusion of the asylum seeker as one that would overwhelm and thus break the system (Ahmed, 2004, p. 122). These words were part of a discursive process of attaching the emotions of fear and anxiety to the body of the asylum seeker, while they also constituted this body as a fearful subject producing anxiety among other subjects. Thus, Ahmed (2004a) sees emotions as phenomena that shape the 'surfaces' (p. 121) of objects and bodies just as much as they evoke different bodily intensities; emotions are not only felt, but they are also signifying objects and bodies, while guiding us on how to affectively react towards such.

In her work, Ahmed is interested in how 'emotions *do things*' (2004a, p. 119). She argues that emotions have very particular effects, while they also orientate us in particular directions (Ahmed 2010; see also Ahmed, 2006, 2017). For instance, in her book *The Promise of Happiness* (2010), Ahmed contends that happiness is an emotion that produces an attractive bodily comfort, and that people thus orientate themselves towards what she terms *happy objects*, understood as objects that are invested with – or attached to – a promise of happiness (p. 21). In contrast, shame has been theorised as an emotion that produces unattractive bodily discomfort, defined as 'a sickness within the self' (Tomkins, 2005, p. 136), and people therefore orientate themselves away from matters that motivate or attach shame (see also Author A, 2021). In that way, emotions do very specific things to our bodies in making them feel either comfortable or uncomfortable, while they also

make us either turn towards or away from specific objects and subjects (Ahmed, 2010; see also Author A, 2021; Kantola et al., 2019). For instance, in a context of Danish school and education, Bjerg and Staunæs (2011) have demonstrated how productions of affect in addition to discourse direct the behaviour and aspirations of students toward specific educational objectives. Similarly, Shoshanna (2021) has illustrated how an Israeli boarding school for disadvantaged students, deliberately produces affect in the form of gratitude to direct students' attitude and thus aspirations away from certain educational matters and towards other governmental-educational goals.

In the analysis beneath, we use Ahmed's approach to analyse the forming of girls' aspirations in the STEM classroom. We theorise aspirations as phenomena that are governed in complex interactions between discourse, affect, and (collective) bodies, while we also attempt to flesh out how a broad affect-theoretical foundation and focus is imperative for analysing the formation of girls' future STEM aspirations. Following Ahmed's approach, we first analyse which discourses about STEM that circulate among the girls. Second, we explore both the felt and sticky emotions that are produced by these discourses, and which student subject positions that are produced as a result of this. Lastly, we analyse the implications of these affective student subject positions for the formation of girls' future STEM aspirations. In this way, we focus not only on the (dis)comforts that move between the bodies of girls in the STEM classroom, but also the different affectively (un)attractive student subject positions that are produced and made available for girls to adopt. First, however, we introduce the study that the article is based on.

**Methods and data**

This article draws on data from a qualitative study of the formation of girls' STEM aspirations in schooling. The project combines ethnographic observations,

qualitative interviews, and photo voice with young girls in a Danish public school. The co-educational school was chosen as a case for this study because of their explicit focus on fostering an interest in STEM subjects among girls. Author A was granted access to the school to observe STEM classes, STEM teachers' planning meetings, and annual STEM thematic days over the course of a year. However, the Covid-19-induced lockdown of schools a few months into the project cut short the fieldwork component and complicated the photo voice task and associated interviews. These activities had to be scheduled for when low infection rates allowed for face-to-face teaching and, in particular, when teachers had the capacity to support the project. While the school is a co-educational school, only girls were invited for interviews in line with the project's overall focus on girls and STEM. Focus was on grade 7 and 8 as differentiated STEM subjects are not taught in Danish schools before 7th grade. Until then, students are taught the subject Nature and Technology, covering Geography, Biology, and Physics/Chemistry. From 7th grade onwards, more nuanced insights to perceptions of STEM subjects and STEM aspirations are thus more likely.

In this paper we mainly draw on data from qualitative interviews and a photo voice task with the 8th grade students (12 girls, all aged 13) conducted over two weeks in mid 2020, while ethnographic observations in STEM classes serve to contextualise the analysis. We combined qualitative interviews with a photo voice task (Author B, 2017; Staunæs, 1998) because of the project's aim to not only capture discourse but also affect. As such, photo voice was used to capture 'embodied sensations and "felt" dimensions' (Coffey, 2019, p. 1), while interviews allowed for the girls to reflectively and discursively communicate about their affective experiences with STEM subjects, as well as elaborate on the emotions they had attempted to capture in their photos. The girls were asked to use their smartphones to take three photos each day for a full week in STEM classes,

and the photos had to be of things, situations, people, or exercises that made them feel either good or bad about STEM subjects. If something important happened in other subjects, or outside of school, they could also take photos outside of the STEM classroom. In addition, the girls were informed that their photos were confidential, and that only Author A would know who had taken which photos. They were also instructed about how to share their photos to a safe drive. For ethical reasons, they were further told to make sure not to take photos of faces, just like they should think about taking photos of peers and teachers in a respectful way. In total, the girls took 116 photos, depicting a multitude of situations ranging from STEM activities, to screenshots of a digital football, and online career activities. Overall, the photo voice task was productive; however, occasionally a participant had forgotten why she had taken a specific photo when interviewed about this, and other girls revealed that some of their photos were primarily taken to reach the three photos a day request. A few girls also expressed difficulties in having to remember to take photos in the STEM classroom as they were not usually allowed to use their smartphones in class. As such, the task was challenging to some girls.

The subsequent interviews were guided by a semi-structured interview guide (Kvale & Brinkman, 2013), designed to make the girls communicate about and elaborate on emotions with the photos as anchoring 'communication-starters'. In addition to the photos, the interview guide also covered topics such as future dreams and aspirations, and attitudes of friends and family towards these future dreams and aspirations, with questions formulated in age-appropriate ways. Interviews varied significantly in length, with the shortest being just over 12 minutes and the longest 41 minutes, but on average lasting around 30 min. While all girls had consented to participate and were aware of the voluntary nature of the interview, some seemed more comfortable in the individual interview setting than

others, and not all girls had much to add to their photos. It was difficult to determine the reason behind the very short interview with Charlie (12 minutes), but in a similarly short interview with Violet (15 minutes), she clearly expressed her scepticism in asking where the interview data would appear, just like she was careful in not making any statements that would position her as critical towards any subjects. In this way, some girls where clearly sceptical about the interviews, potentially a result of the pandemic not allowing for trustful relationships to have been built between the researcher and the girls before the interviews.

All interviews were transcribed verbatim and participants' names and other identifying information was anonymised. Due to the participants' age, informed consent was secured from parents as well as from the girls themselves. Interview data was digitally recorded and immediately after uploaded to a secure drive. In Denmark there are no institutional review boards, but the project follows common, social science ethics guidelines and follows the guidelines of the Danish Data Protection Agency.

Both interview and visual data were analysed through a three-step qualitative content analysis. The first step entailed a thorough reading of all transcripts and looking through all photos to trace immediate themes and patterns in the data (Mayring, 2000; Stemler, 2000). The second and third steps (Hsieh & Shannon, 2005) involved a close reading of transcripts, while we searched for key statements, showing how the girls perceived of STEM subjects as an object in Ahmed's terms, and how the girls related to this object discursively as well as affectively. Lastly, these key statements were linked to the accompanying photos to explore if they could bring further aspects to the analysis. As such, while the photos played a key role in the interviews in terms of motivating a dialogue centred on emotions, in the analysis we have mainly used them to underline our analytical points. This in part illustrates the methodological challenges related to

'capturing' affect through the photo voice task, which we return to in the Discussion. In the following analysis, we first explore how the girls perceive of and affectively relate to STEM subjects and second how this form their future STEM aspirations.

**What is STEM? (Un)comfortable facts and fixed rules**

Reading through our data, a very clear depiction of STEM subjects quickly stood out. Across the interviews, participants considered STEM subjects to be focused on non-negotiable facts, theorems, and rules, or in the words of Alba, as subjects that involved 'a lot of theory and things that you have to remember'. This was a theme across all interviews and was for instance also brought up by Alexandra. Throughout the interview Alexandra expressed a clear interest in academic topics, and whereas most other girls' photos were a mix of both STEM classroom exercises and social activities, Alexandra had primarily taken photos of school tasks related to Maths and algebra. When asked why she found STEM subjects interesting, Alexandra stated:

> I just like that there are real facts, and fixed rules, and those kinds of things. Also, like, when I am going to get a job, I'm not really into something like leadership, where you have to sit and listen to people's feelings and those kinds of things.

Alexandra's preference for 'real facts and fixed rules' is what underpins her attraction to STEM subjects in school. Importantly, this is not only an interest that is relevant in the present, but also as she considers her future career and future self. By describing her dislike for 'listen[ing] to people's feelings' and similar 'soft' tasks associated with 'leadership' jobs, she implicitly aligns herself with representations of STEM as 'hard' science, removed from feelings. We return to the future dimension of Alexandra's quote later on in the analysis, but first we

want to unpack why these 'fixed rules' can be attractive. Maya, who had only taken very few photos, was prompted by a photo of the school's intranet, showing a cancelled Physics/chemistry class (see Fig. 1), to describe her disappointment with this cancellation as this was one of her favourite subjects alongside Maths. In expressing her disappointment with the cancelled Physics/chemistry class, Maya stated:

> I just really like the numbers. It's that thing about the rules again. It's just fun to solve an equation. Like, when you do this, then it will always turn out this way. There are some simple things – or they are not necessarily simple – but they are just all you need. You can always measure the area of a square. It's not like it can change, like it's the case in other subjects, it's not like there are any irregular squares.

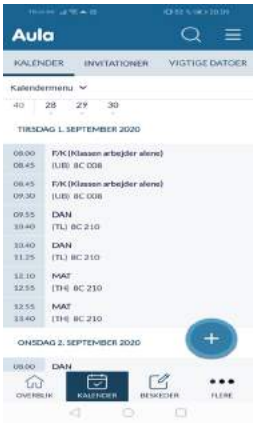


Fig. 1: Screenshot showing that the class works alone in Physics/chemistry [FK (klassen arbejder alene)]

For Maya, the main attraction of STEM subjects is the absence of 'irregular squares'. The regularities, or rules, that characterise Maths or Physics/Chemistry as subjects mean that you will always get the exact same results when you do

things the right way. This brings feelings of comfort as Maya finds a sense of security in always being able to rely on the rules in finding the right answer. Here we can see how the quote adds a felt and affective dimension to how Maya relates to STEM subjects – these subjects 'feel good' because of their predictability and regularity. This dimension is also visible in the next quote from Violet. Violet's photos stood out from the other girls' photos as she was the only one who had taken a photo from outside of the school and thereby demonstrated how her interest in STEM was not only pursued in school and the STEM classroom but also outside these. The photo, taken at home, showed a homebuilt version of Newton's mirror telescope, which Violet had constructed from an empty toilet paper roll, pieces of tinfoil, and some rubber bands, after reading about telescopes in school and thinking 'I have to try that!' (Violet).

Fig. 2: Violet's homebuilt mirror telescope

Based on the photo of the impressive, homebuilt telescope, Violet told why she felt so excited about STEM and why she liked STEM subjects more than the other subjects taught at school:

> Well, I just feel, like, in Danish you almost always succeed. But you never know when you really have done well because you can always do it better. When you make experiments you either succeed or you don't.

For Violet, the natural sciences' regularities and 'laws' mean that what constitutes 'success' is not up for discussion – the experiments succeed or fail, bringing a very clear measure of whether you did well or not. As such, there is a comfort to be found in the transparency of STEM subjects compared to e.g., the more 'fluid' (Alexandra) and 'opinion-based' (Maya) Humanities subjects, because these subjects leave one in an affective space of uncertainty where you never know whether you have succeeded or not 'because you can always do it better' (Maya).

While all girls described STEM subjects as characterised by facts and fixed rules, not all girls agreed that these characteristics produced the comfort that the girls quoted above experienced. On the contrary, for some girls this was the source of discomfort in the form of stress, anxiety, fear, and insecurity. This was also visible in the fieldnotes from the classroom observations, which described shaking voices and flaring, red faces, thereby revealing how a specific exercise including rote learning of 30 different chemical elements created a visible discomfort among the girls, who were randomly picked upon to present either the abbreviation or the characteristics of a specific chemical element. Most girls did well in this memory task, but a few appeared on the verge of tears as they failed in remembering these details and thus in delivering the right answer to the teacher's questions. Asking Alba about STEM subjects in her interview, she also stated:

> You have to remember a lot of things, so it's not really my favourite subject, because there are so many things that you have to remember… And it can be a bit stressful, because some people are really good at remembering all those kinds of things, and then maybe there are some people that are not as good at

> remembering those things, and then you get a little stressed about not being able to remember just that thing, and then I feel bad, and I feel like I might get a bad grade.

In contrast to Maya and Violet above, for Alba rules produce a fear of failing because of 'not being able to remember just that thing' and thus providing a wrong answer. The necessity to memorise and remember all of the rules in STEM subjects is 'a bit stressful'. The stress seems to be less tied to understanding the subject matter in itself, and more to performing well – or not – in terms of grades. That is, the fixed rules produce a form of felt anxiety as they make her 'feel bad' and fear that she 'might get a bad grade'. This focus on grades has also been identified in other studies, suggesting that students' (perceived) ability to get a good grade is important for how they relate to a subject (Palmer et al., 2017). Leah's STEM classroom photos also emphasised the importance of grades. For instance, one of her photos depicted her computer screen showing a page from an essay, where she wrote about how the major focus on grades in Maths produced a felt 'nervousness' and 'stress', mainly among the girls, because 'boys usually do not feel the pressure, because most boys do not take things as seriously' (Leah). The focus on grades in Alba's and Leah'a quotes may be indicating a strong performance culture, as well as reflect the novelty of getting grades because 8$^{th}$ grade is the first year when students in Danish public schools get formal grades. And not all students share Leah's and Alba's feelings of stress. For instance, Lizzy felt that the possibility of improving one's grades was motivating: 'when you see that you go up a grade that's awesome!' Hence, grades produce different felt emotions among the girls, however all based on a desire to perform well.

Summing up, in this section we have demonstrated how at the discursive level STEM is characterised by facts, fixed rules and procedures that must be memorised, and how these characteristics produce felt emotions that include both

comfort and discomfort. In the next section we explore how these emotions 'stick' to specific subject positions.

**STEM as a prestige object: (Un)attractive student subject positions**

Here we focus on the subject positions that the discursive representation of STEM subjects contain. More specifically, we are interested in how the discourses that circulate among girls in the STEM classroom attach certain emotions to specific student subject positions in constituting these as either affectively attractive or unattractive. Based on her photos of Maths and Algebra tasks introduced above, the following conversation took place between Alexandra and the interviewer:

Interviewer: But is there something to the fact that it is, like, divided between boys and girls when it comes to having an interest [in STEM] or not? And maybe also when it comes to whether you find it cool to have an interest [in STEM] or not?

Alexandra: I think that it is more divided by what you like and what you do not like. I just think that some people just choose the easy way out. And maybe it's just not as easy to skip the difficult things in STEM subjects. And that's maybe also why they are not their favourite subjects.

Interviewer: Why is it easier to skip the difficult things in the other subjects?

Alexandra: Because they are more fluid. They don't have a fixed result, so it's easier to get out of the hard work, that's my theory, somehow you can do that.

In this quote, Alexandra constructs STEM subjects as subjects that require more 'hard work' than other subjects. This means that students that show an interest in STEM subjects are labelled as being among the most ambitious and hardworking students, while those who do not find an interest in STEM subjects are simply students who are not willing to put in the effort to develop that interest; students who are too 'lazy' to put in the work needed to be good at STEM. Laziness is not a valued characteristic in contemporary, neoliberal societies. Rather, hard work and aspiration is what characterises the 'good' neoliberal individual (Mendick et al., 2018). Hence, when Alexandra positions students without an interest in STEM as 'lazy', she is also indirectly positioning herself as an aspirational, 'good' individual. Alexandra was not the only girl constituting STEM as a 'prestige object', attracting ambitious students, so did Maya:

> In Danish you can be good at one thing and then bad at another thing. But in the natural sciences, STEM subjects, it's more, like, you have to be good at figuring out how it all connects. I feel like you need a certain kind of brain […] I mean, you need a brain that can figure out stuff, and, like, how it all connects. But, I mean, there are some that do not have those skills, and then their brain does not think like that. Not because they are stupid, just because they're not very good at that… I mean it's not very fluid subjects [STEM subjects]. It's very much, like, that's what it's like, it's kind of like Maths. That's just how it is, and you just have to learn the facts. There are not as many opinions. I mean, you cannot just *mean* that that all the chemical elements are an invention that someone has just made up. I mean, that's just the way it is, and there's not much you can do about it.

According to Maya, Danish and other humanities subjects are easier subjects as you can do well in these subjects simply by having 'opinions'. This contrasts with STEM subjects which require actual work to 'figure out stuff', including 'how it

all connects'. Hence, being good at STEM labels you as being among the most ambitious and skilled students: students that are gifted with 'a certain brain' that makes them able to 'learn the facts' instead of just 'mean[ing]' something. And again, in contrast, students who do *not* have STEM interests and skills are perceived as students who 'choose the easy way out' and who are 'not … stupid' but still not smart enough to engage with STEM. As such, the STEM discourse produces specific subject positions that are not just different, but clearly hierarchical and carrying different value amongst the students. With Ahmed (2004a) in mind, we argue that each subject position is attached to different sets of 'sticky' emotions (p. 120). On the one hand these include positive emotions such as admiration and appreciation, attached to students who express STEM interests and skills. On the other hand, we find emotions that are negative, like the ones that get attached to students who do not express STEM interests and skills. Fieldnotes support that the positive and negative emotional 'surfacing' (Ahmed 2004a, p. 121) of students' bodies guide other students on how to emotionally react to them. For instance, Alexandra, who had both STEM interests and skills, was the focus of much positive attention from other students who often asked for her assistance in solving different issues, including non-STEM related ones. Leah stated the following when asked who she preferred to get assistance from in classroom exercises:

> Interview: So, who do you go to for help?
>
> Leah: Personally, I like going to Alexandra, because she's just really good at helping you.

As such, Leah emphasised that Alexandra motivated a comfort, in the sense of some form of support and care, in her.

The STEM discourse, and its hierarchy of subject positions, is not only upheld by the students who have an interest in STEM and therefore inhabit an affectively attractive subject position within this discourse, but also by girls *without* an interest in STEM. These girls appeared to have adopted a less affectively attractive subject position that discredits their academic interests and skills in non-STEM subjects. For instance, the following conversation with Sonya took place after Sonya earlier on in the interview had stated that 'I'm really good at English and History. They are probably my top subjects':

Interviewer: Is there a difference between being good at for instance History and then Math? Is it cooler to be good at one more than the other?

Sonya: Yes, I think that it's better to be good at Maths, because in History we read more, so it's pretty easy to find the answers, whereas in Maths, you can't just read in a box to get the answer. You have to ask… For instance, in History you can just search for "When did the Second World War begin?" You typically just search for the answer on the Internet, whereas in Maths you need to ask people. So, it's cooler to be good at Maths.

According to Sonya, STEM subjects are complex subjects that are 'cool[er]' than Humanities subjects like History, despite her own interest in and flair for such Humanities subjects. This hierarchy of objects attached to more and less prestige result in girls without an interest in STEM denigrating their own academic interests and skills. This was also clear in the interview with Alba, who described that she received top grades in Danish and then went on to compare herself to her sister:

> My sister did not know what to choose either [after primary school], so she just chose Biotech because that gives you a lot of options afterwards… That's of course a really smart thing to do, but I don't think that I will do that, because you have to be really smart to be able to study Biotech and that's not really me.

While Alba is a top student in Humanities subjects like Danish, she described herself as not 'really smart'; as inferior to her sister who has STEM skills. In this way, Alba seems to believe that unless you excel in STEM – e.g., in Biochemistry – you are not 'really smart'.

**A happy STEM future for all girls?**

In the interviews, the girls were also asked about their imagined futures and whether they might be pursuing a future that involved STEM. In this final section of the analysis, we explore how the students orientate themselves to the future in the context of the perceptions of STEM described above. As this theme was less developed in most interviews, the analysis in this section is somewhat tentative.

First, we return to the interview with Alba above, where the dialogue moved on to explore other photos she had taken. Reflecting on a series of photos of algebra pieces that she found difficult, Alba veered away from positioning herself as not being 'clever' enough:

> Well, I just really want to do something that makes me really happy. And it has to be something fun, but something I'm educated for, because some people choose not to get an education, and then they can work in a shop or something like that, and I have never thought of that as very exciting. I'd rather do something where you can go outside, and then you would probably think of the Zoo, but that's not really me, because I think it smells too much.

For Alba, aspiring to a future outside of STEM was a matter of focusing on 'something that make[s] [her] really happy', rather than pursuing a future in STEM like her sister above. Alba did not seem willing to trade positive emotions such as feeling 'happy' or having 'fun' for a successful future as a proud or revered STEM student. Setting up this distinction between her sister's strategic choice and her own focus on being 'happy' becomes a means of inhabiting the unattractive subject position of someone not 'smart' enough for STEM subjects as she can 'defer' to an attractive future that promises a sense of happiness and thus comfort. Sonya voiced a similar orientation. We introduced Sonya earlier when she described how Math was 'cooler' than subjects such as History. Asked about what she would like to work with in the future, Sonya explained:

> I think something with Law. I'm very interested in laws and mysteries and those kinds of things. I've always thought that could be interesting. And then I also like things such as working with families and helping people to get a better family life […] But of course I don't really know yet, because it's far away. Otherwise, I would want to be a teacher because I'm really interested in History and English, and then I could be a teacher in those subjects.

Despite her disregard for Humanities subjects and explicitly ranking History lower in the hierarchy of academic subjects, Sonya declared an interest in pursuing a career involving History. While Sonya does not explicitly mention happiness, she speaks about pursuing a career that aligns with her interests and passion for helping others, rather than a career choice based on for instance good employment prospects, opening up opportunities, etc. In that sense, it is an aspiration that 'feels right' rather than a choice based on strategic considerations. Through this, Sonya seems willing to choose an academic field – and thus adopt a student subject position – that she has indeed participated in constituting as unattractive and thus

uncomfortable herself. Hence, like Alba, Sonya appears to accept some sense of discomfort in the present as she can envision future comfort.

This negotiation or trade-off between present and future comfort and discomfort in developing future aspirations is not confined to the girls who are not interested in pursuing STEM careers. For instance, Alexandra stated the following when asked about why she finds STEM – and a future career in STEM – attractive:

> Alexandra: I think it's exciting, and I think it's interesting, and I think that it is important. I also think that it's something that I often prioritise more than my interest warrants, but I actually find that it's both interesting and important…
>
> Interviewer: When you say that you often prioritise it higher than you find it interesting, then what do you mean?
>
> Alexandra: Well, it's important for my education and the things that I want to achieve… I can't deny that I prioritise my education, and I have very high expectations for myself. So, I have just chosen a STEM path, and that of course means that STEM subjects are more important to me, and even if I didn't find them the most interesting, I might prioritise them higher anyway, but I do find them interesting.

While Alexandra was careful to emphasise how she finds STEM subjects 'exciting', 'interesting', and 'important', the quote also illustrates how she has sought to be strategic in her choice of subjects. As such, Alexandra's prioritisation of STEM subjects was not just based on a positive, affective interest in the subject matter, but also on a willingness to accept uncomfortable emotions such as disinterest and boredom in the present, to fulfil her future aspirations. Indeed, for

Alexandra a career in STEM is something that will bring her closer to 'the things [she] wants to achieve' and in that way something that generates comfortable emotions in the future, even if this may involve a tolerance for bodily states of discomfort along the way. With Ahmed's concept of *happy objects* in mind, we can understand the girls' navigation of subjects and future aspirations as being a matter of different happy objects, i.e., that is different objects that are seen as holding the key to future happiness. For the STEM-capable girls, STEM is the happy object, even if not associated with pure comfort and positive emotions in the present. For the girls who do not see themselves as capable of such happy STEM futures, other pathways to a happy future must be identified; pathways that may require them to inhabit uncomfortable positions and negative emotions in the present, but where future happiness may still be within reach through less prestigious, but nevertheless happy objects. What this illustrates is how the girls' future aspirations are developed in a complex affective space, where they constantly negotiate complicated and contradictory, comfortable and uncomfortable bodily states in deciding what choice of future career that will make them most happy. For very few of them, this is a straightforward process and for most there is some form of trade-off between comfort and discomfort.

**Discussion**

In the analysis above, we have shown how young school girls perceive of STEM subjects and how they relate to these subjects themselves, in the present and their imagined futures. In particular, we have focused on the affective dimensions of these processes. In this Discussion we want to highlight a number of insights that our analysis generates. Perhaps most strikingly, our analysis suggests a shift in the value ascribed to both STEM subjects and STEM-interested students. In the existing literature, STEM subjects have typically been seen as difficult and for the 'clever' students only, and students pursuing these subjects labelled as 'geeks'

(Archer et al., 2013), 'square girls' (Renold, 2001) or 'brainiacs' (Archer & DeWitt, 2015, p. 95). In the present study, the perception of STEM subjects as difficult and requiring 'specific brains' persisted, but the value ascribed to this was different. Indeed, students who were good at STEM were held in high regard and inhabited attractive subject positions as hard working and/or gifted; positions to which positive emotions were sticking. In contrast, students who excelled in other subjects, but not in STEM subjects, were assigned emotionally unattractive subject positions that essentially held not just different, but lower value. Further, as mentioned in the introduction, the existing literature has also pointed out how girls in particular have traditionally found it difficult to align their potential science interests with conventional femininity (Francis et al., 2017; see also Archer et al., 2013). In our analysis, however, this appears to be less of a challenge, at least for those girls who seem to have STEM skills. We suggest that this is closely related to the shifting valorisation of STEM subjects (in the double meaning of the word): STEM as a 'prestige object' can now be incorporated into an identity as a 'successful girl' (Ringrose, 2007) who performs well in school as well as in the future labour market. As such, STEM subjects have also obtained a position within the discourse on so-called '12-tals piger' ['straight A girls'], a term developed by Danish media to account for high-performing girls in the educational system, whose wellbeing and self-esteem gets negatively affected by their educational ambitions (Hansen & Nygaard, 2017; Nedergaard, 2017). This finding calls for another, but indeed relevant, discussion about STEM subjects as potentially new gendered stress- and anxiety provoking triggers in the (Danish) educational system.

We are not suggesting that the findings from this qualitative study are generalisable, and we are aware that the school's particular focus on STEM may contribute to the positive connotations surrounding STEM subjects. Nevertheless,

these findings are not produced in a vacuum specific to this particular school. The discourses that we can identify in the data – on STEM as a prestige object and one that is linked to a happy future characterised by opportunities and 'success' – are not just local discourses. On the contrary, they reflect broader cultural and social understandings and representations of STEM subjects that we argue are at least in part attributable to the numerous policy campaigns and initiatives that have flourished over the past decade, aiming to 'glitter up' STEM subjects to make them 'glamourous' and thereby supposedly attractive for girls (see Watermeyer, 2012). International policy actors such as the OECD (2017) and UNESCO (2018), and global corporate actors, such as Microsoft (2016) and Google (Stych, 2018), have invested large economic resources in showing glamorous images of women STEM workers, developing 'fun' STEM thematic days for girls only, and in building innovative labs where girls can explore their STEM interests.

In this paper we have sought to focus on affective dimensions of young girls' STEM aspiration formation, both conceptually and empirically. By drawing on Ahmed's work in particular, we have explored how a focus on affective dimensions of aspirations can shed light on processes such as the 'sticky' aspects of certain emotions that become attached to specific subject positions, and in that sense the emotional gains or costs of being a 'good' STEM student or not, respectively. Our analytical approach also enabled us to consider the trade-offs between comfort and discomfort in the girls' discussions of their future aspirations, and in a broader sense consider how the participants future aspirations were not simply a matter of balancing interests, knowledge, skills, availability etc., but also how different future options 'feel'. Empirically, we pursued our focus on affect and emotion through the photo voice task that we asked students to participate in. While this posed some challenges, as described earlier on, in terms of e.g., photos that were not necessarily telling on their own, sometimes a lacking

recollection of what the photos depicted, and an eagerness to fulfil the task correctly, the task did prompt the participants to consider STEM classes in a somewhat different light and the photos thus served as conversation starters. Future research could explore to what extent the participants' age played into the methodological difficulties by applying a similar method to older students.

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# CHAPTER 7
# DISCUSSION

In the first part of this chapter, I attempt to answer the first half of the overall research question: how does gendered educational STEM policy organise and govern girls' STEM aspirations? To this end, I discuss how the three articles' analytical findings serve to answer the thesis' three guiding questions: (1) How does gendered educational STEM policy attempt to organise and govern girls' STEM aspirations through productions of affect and time? (2) Which futures does gendered educational STEM policy organise, and how do these condition gendered subjectivity? And (3) in what ways do girls' affectively and temporally relate to STEM? In the second part of the chapter, I discuss the analytical findings in relation to the dangers of glitter remarked upon by Pete Doherty (2005). Hence, I also use this second part to discuss an answer to the second half of the overall research question: what implications might this [organising and governing] have? In the third and last part of the chapter, I discuss the thesis' contributions to current research and some of the future research one might relevantly pursue in the light of the thesis' findings.

**7.1 Findings: Productions of Affect, Time, and Subjectivity |** Article 1 shows how gendered educational STEM policy attempts to organise and govern girls' STEM aspirations by producing positive future times and future optimism. Producing different discursive narratives, gendered educational STEM policy invests positive affective meaning in a STEM future, while also promising better and more desirable futures for girls in STEM: a future in STEM is a future of celebration and praise, and of fun, excitement, and thrilling exercises and experiments. Besides celebration and fun, gendered educational STEM policy also promises a future in STEM as holding glittery materiality, such as shiny labs, gleaming technology, and innovative didactics and teaching practices based on the use of that technology. Focusing on a specific local gendered educational STEM policy, Article 1 shows how this policy uses discursive communication to invest

positive affective meaning in a STEM future, but also deploys the material, policy-motivated (re)design of a STEM classroom that becomes a bright lab, with a well-lit, socially oriented interior, and a big, new, and glowing interactive touchscreen. In answer to guiding question 1, this finding thus indicates that gendered educational STEM policy attempts to govern girls' STEM aspirations by producing discursive narratives that invest positive affective meaning in a STEM future. As such, the policy also seeks to organise and govern girls' STEM aspirations by producing glittery, better, and more desirable futures for girls in STEM.

Nuancing the findings from Article 1, Article 2 demonstrates which particular glittery, better, and more desirable futures gendered educational STEM policy produces for girls to participate in, and how these condition a very particular gendered subjectivity. The article demonstrates that gendered educational STEM policy organises STEM futures to which girls should be drawn because of their interests in beauty and/or caring practices. The policy organises futures in STEM where girls can indulge in glittery practices of producing make-up, designing clothing, and nurturing prettiness. Moreover, it organises futures in STEM where girls can engage with the caring practices of saving lives and ensuring a better, healthier, and less polluted world for us to live in. Emphasising beauty and/or caring practices, gendered educational STEM policy organises STEM futures where girls are subjects that like the colour pink and enjoy dressing up, prettifying surfaces, taking care of others, and working for a better world. In this light, guiding question 2 can be answered thus: gendered educational STEM policy organises STEM futures that condition a new, glittery, gendered subjectivity involving interests in beauty, make-up, clothing, and saving lives and the world. As such, being a girl that aspires to a STEM future also entails being a 'glitter-girl' desiring a life of glitter, glamour, and the care of others.

Article 3 illustrates how many girls consider a future in STEM as no more positive, better, or desirable than non-STEM related futures. Accordingly, the article demonstrates how many girls do not accept the discursive narratives and affective investments made by gendered educational STEM policy, instead imagining a STEM future that includes stress, anxiety, fear, and insecurity. To them STEM is tantamount to fixed rules and thus requires a 'certain kind of brain' and diligence to manage the memorisation and retention of the information required. Thus, in answer to guiding question 3, this finding indicates that a number of girls relate to a STEM future as a life with discomfort, and they do therefore not aspire to pursue either further STEM education or a STEM career after their mandatory STEM education.

However, the experience of STEM as having fixed rules does not discomfit all girls. Indeed, some girls find comfort and security in the fixed rules, which transparently map their path to success: if you follow the rules, you will get the right results, and so succeed. In addition to creating a sense of security, the fixed rules make STEM prestigious in that following the rules requires intensively memorising and retaining information, precisely the hard work about which some girls feel stress and apprehension. Hence, another answer to guiding question 3 is that a group of girls relate to a future in STEM as one of comfort, as they see a future in STEM as bestowing security, success, and prestige. They therefore also aspire to enter further STEM education and a STEM career after finishing mandatory STEM education.

But the girls that aspire to a future in STEM are not affectively unambiguous about what this future entails. They indicate that the choice of pursuing further STEM education and a STEM career is – also – based on strategic calculations. As such, the security, success, and prestige elements of STEM appear to have greater weight than 'pure' happiness. The girls aspiring to a happy future in STEM

communicate that such future would mean some boredom and a need to make STEM a priority higher than their actual interest in STEM warrants. In that way, the girls also indicate that their aspirations are as tactical as they are affective. Based on this finding, a third and more complete answer to guiding question 3 is that girls relate to a STEM future in unique and affectively, temporally mixed ways. Some girls find the fixed rules of STEM discomfiting, whereas others find them comforting. However, even those finding comfort are not fully comfortably, instead appearing to accept the fact that having a comfortable future in STEM will require some discomfort.

Returning to the first half of the overall research question, one can use the answers to the three guiding questions to argue that gendered educational STEM policy organises and governs girls' STEM aspirations by (1) producing glittery, better, and more desirable futures for girls in STEM. These futures condition a new glittery, gendered subjectivity. As such, gendered educational STEM policy organises and governs girls' STEM aspirations by (2) organising STEM futures that condition a new, glittery, gendered subjectivity involving interests in beauty, make-up, clothing, saving lives, and saving the world, while being a girl that aspires to a STEM future also entails being a 'glitter-girl' desiring a life of glitter, glamour, and the care of others. Lastly, gendered educational STEM policy arguably organises and governs girls' STEM aspirations by (3) not organising and governing such aspirations. The Analysis shows that girls affectively and temporally relate to STEM in unique and mixed ways that are not immediately comparable to the affects and times the policy produces. Thus, girls' STEM aspirations might – paradoxically – be organised and governed by gendered educational STEM policy by not being organised and governed by such policy.

However, gendered educational STEM policy indeed does more than organise and govern girls' STEM aspirations by producing glittery, better, and more desirable

futures in STEM; by conditioning new, glittery, gendered subjectivity; and – paradoxically – by not organising and governing these aspirations. I discuss this 'more' below, as I also discuss the answer to the second half the overall research question: what implications might this [organising and governing] have?

**7.2 Findings: 'Broken glass. It's just like glitter, isn't it?' |** As I demonstrated in the Contextualisation, gendered educational STEM policy attempts to attract girls to STEM by coating it in glitter. As such, the policy sprinkles glitter in an attempt to foster STEM aspirations in girls and allure them into future STEM education and ultimately STEM careers. As I have also argued in the Theoretical Framework, however, sprinkling glitter to allure, organise, and govern social behaviour, is a perilous undertaking, and glitter should therefore be sprinkled with caution. Indeed, glitter is unruly, uncontrollable, and unpredictable, and, although producing illumination, sight, knowledge, and bright futures, it simultaneously produces darkness, blindness, ignorance, and (potentially gloomier) past, present, and alternative future times. In this section, I scrutinise the dangers that might be lurking in the glittery world of STEM by discussing the analytical findings in relation to the insights gained from the new material/discursive concept of glitter. In this section, I thus return to the Contextualisation and the many critical questions the Pete Doherty (2005) quote opens with regard to the dangers of glitter.

Article 1 has shown that gendered educational STEM policy organises and governs girls' STEM aspirations by producing positive affects and future times. As such, the policy organises and governs girls' STEM aspirations by producing glittery, better, and more desirable futures for girls in STEM. However, as the new material/discursive concept of glitter *illuminates*, the production of glittery future time is never just a production of glittery future time, but also a production of past, present, and alternative future times that diffractively exist in and through the

glittery future time. Thus, in producing glittery, better, and more desirable futures, gendered educational STEM policy is destined to also produce past, present, and alternative future times.

Article 1 reveals that gendered educational STEM policy produces negative and darker past times, as the policy implicitly invests negative meaning in the past by presenting the future as better and more desirable. It also explicitly invests negative affective meaning in past times through a discursive narrative about the past as a place where women are ignored and disregarded in favour of men. Hence, organising and governing girls' STEM aspirations through the production of glittery, better, and more desirable futures implies the simultaneous production of other times, including negative and darker past times. This means that when gendered educational STEM policy attempts to constitute specific aspirational learning spaces by producing glittery, better, and more desirable STEM futures, the policy actually constitutes aspirational learning spaces of these futures, but *also* of negative and darker past times.

Further, Article 2 demonstrates that these STEM futures that gendered educational STEM policy produces condition a particular gendered subjectivity – a new, glittery, gendered subjectivity that involves interests in beauty, make-up, clothing, saving lives, and saving the world, meaning that being a girl in STEM entails being a 'glitter-girl' desiring a life of glitter, glamour, and the care of others. As such, gendered educational STEM policy organises STEM futures that ascribe an interest in beauty and/or caring practices to girls, as well as condition a new glittery, gendered subjectivity. This conditioning arguably creates new glittery opportunities for being a girl in STEM, thus implying that a new type of girl previously unable to identify with male-dominated, 'geeky' STEM, can now feel attracted to STEM (see Archer et al., 2013).

Conversely, however, this conditioning also implies a (re)production of stereotypes that will dissuade a large number of girls from feeling attracted to STEM (see Pearse & Connell, 2015; see also Sandager & Pors, 2020). Girls are not naturally interested in beauty and/or caring practices simply because they are girls; they – like anyone else – have a variety of interests and so will not all identify with interests in beauty and/or caring practices (see Ahlqvist et al., 2013). Thus, the inclusion of girls not previously attracted to STEM could be an implication of organising and governing girls' STEM aspirations by organising the above STEM futures, as this conditions a new glittery, gendered subjectivity that ascribes an interest in beauty and/or caring practices to girls. However, an exclusion of non-stereotypical girls attracted to non-glittery STEM is also an inescapable implication. For instance, girls attracted to a STEM future by un-glittery elements like empirically lengthy experiments, in-depth probes of new worlds, and the occasional ugliness of nature and biology will no longer find STEM attractive if glittery Barbies, the stardom of Pharrell Williams, and shimmering, pink lipsticks, and nail polishes replace those elements.

Indeed, the findings of Article 3 support the argument that glittery STEM is as exclusionary as it is inclusionary. The article argues that in constituting STEM as a glittery and glamourous prestige object, gendered educational STEM policy might allure some girls to STEM, but it also shows that girls aspire to a STEM future because they experience STEM as tantamount to un-glittery elements like fixed rules. One girl, Alexandra, explicitly states that further STEM education interests her but that she would not want a management position, because that would involve caring practices in the sense of having to 'sit and listen to people's feelings and those kinds of things'. As such, Alexandra emphasises not only her lack of interest in caring practices, but also her interest in STEM as a world that allows her to escape such practices. Thus, in turning un-glittery STEM into

glittery STEM, gendered educational STEM policy unavoidably leads some girls to lose their attraction to a STEM future.

To summarise, sprinkling glitter to organise and govern girls' STEM aspirations implies producing not only glittery, better, and more desirable futures in STEM, but also negative and darker past times. Moreover, sprinkling glitter to govern and organise girls' STEM aspirations implies not only a (potential) inclusion of girls not previously attracted to STEM, but also an exclusion of non-stereotypical girls attracted to non-glittery STEM. Consequently, in sprinkling glitter, gendered educational STEM policy becomes highly over-efficient, in that it produces the affects and times it intends to but certainly also those that it does not. Moreover, it (potentially) allures the attraction of (some) girls to STEM, but also undeniably diverts the attraction of (some) non-stereotypical girls away from STEM. Hence, in sprinkling glitter on the world of STEM, gendered educational STEM policy organises STEM as a composite, complex governing world that is both better and more desirable future times *and* darker, negative past times, and that is both alluring attraction *and* dissuading aversion. The many ambivalent tensions of glittery STEM makes it an uncontrollable and unruly world that arguably also produces a range of unpredictable organising and governing effects.

When one relates these findings to the Pete Doherty (2005) remark concerning the dangers of that which glitters, one realises that glittery STEM is treacherous because it *too* productively and *too* efficiently organises and governs what it intends to but also what it does not, thus making the organising and governing effects of glittery STEM unpredictable. Its effects could take people to a future where (more) girls experience themselves as celebrated, included, and welcome in STEM, as intended, or could just as likely conjure a (past-marked) future where girls (continuously) experience being ignored and excluded. Another peril of glittery STEM is its potential to blind people to its unruly, uncontrollable, and

unpredictable sides, for, like Carrie Bradshaw, we see, and *only* see, alluring glitter. We see only glittery, better, and more desirable futures for girls in STEM, and only new, glittery, inclusive opportunities for being a girl in STEM. We fail to notice the negative, darker past times, and the excluding, (re)production of stereotypes that rule out girls interested in un-glittery STEM, because these times and un-glittery stereotypes lie concealed in the murky shadows of a shimmery, alluring glitter-filled future and the glitzy, new inclusive opportunities for being a girl that aspires to a STEM future. In other words, glittery STEM makes us see, sense, and make sense of a very particular glittery world where things seem fine and the future bright, whether or not this is so. Consequently, glittery STEM may also be organising and governing policy actions of passiveness, whether or not the opposite is needed.

Obviously, these critical findings could call for new, alternative, and improved policy actions other than sprinkling glitter, but that conclusion is hard to draw because glittery STEM might perform as intended. Glittery STEM could attract (more) girls to STEM – just as it might not. To consider this in the *light* of glitter's unruliness as it relates both to diffractively existing times and to stickiness, one could, for instance, further consider whether glitter might not productively stick girls together, organising them in a STEM collective of mutual support in pursuing STEM futures against the odds? As such, one might also ask whether glitter could empower 'glitter-girls' to (re)claim some space in the male-dominated, 'geeky' STEM? In this way, glitter could have a reappropriating and empowering function for girls in STEM similar to that seen in parts of the LGBTQ+ community (e.g., Coleman, 2020). Or, conversely, does glitter now stick to STEM in a way that will make it forever glittery, thus dissuading non-stereotypical girls from aspiring to STEM?

**7.3 Findings: New Insights and Future Research |** The Analysis and the findings from the discussion sections above point to the relevance of thinking about aspirations as organised and governed within 'ghostly' (Pors, Olaison & Otto, 2019; Derrida, 1994, 1999) – or diffractively existing (Barad, 2007, 2013, 2017) – times. In analysing the operations and effects of aspiration-raising policy in the form of gendered educational STEM policy, the findings indicate that girls' STEM aspirations are not simply organised and governed within aspirational learning spaces of future optimism, as the current literature on aspiration-raising policy appears to argue. Rather, their aspirations appear to be organised and governed within temporal disorders where they are indeed under the governing forces of glittery, better, and more desirable futures, but also those of darker and more negative past times. As such, the thesis contributes to the current literature on aspiration formation, and more specifically the literature on aspiration-raising policy, by opening up new questions about how to think about the formation of aspirations in relation to time and temporal productions. The thesis provokes a range of questions: what times does aspiration-raising policy produce? Are they affective? If so, how does aspiration-raising policy produce these (affective) times? In what ways do the (affective) times behave and move? Linearly? Non-linearly? Are there alternatives? Which insights do subjects' experiences provide into the (affective) times produced by aspiration-raising policy? Could such experiences reveal that (affective) times behave and move in uncontrolled and unruly ways because subjects relate to (affective) past, present, and future times in unique and highly mixed ways? And what can this teach one about how to plan and implement future aspiration-raising policy? Some other questions the thesis raises include what effects, consequences, and implications the organisation and governing aspiration-raising policy has through its production of (affective) times. The findings of this thesis have offered some answers to these questions, all of which challenge the current literature's findings. Still, although providing some

answers, the thesis' findings point to the relevance of further exploring the organising and governing operations and effects of aspiration-raising policy in future research.

In addition to contributing to aspiration formation literature, and more specifically that on aspiration-raising policy, the thesis contributes to the literature on affective governmentality by developing a novel concept of affective governmentality that combines Foucault's original concept of governmentality with Ahmed's (2004a, 2004b, 2006, 2010) queer feminist theories on affect. My concept mirrors other scholars' work on affective governmentality, pointing out the importance of focusing on affect when the governing of social behaviour is analysed. However, my concept also differs by explicitly focusing on discourse and discursive narratives in addition to affect. My concept implies that to understand affect and affectively organised and governed behaviour, one has to analyse discourse in addition to affect, as affect and discourse exist in and through each other – indeed, affect exists because of discourse and vice versa. Further, my concept differs from other scholars' work on affective governmentality by focusing on affect as something evoked not just in and by the body, but rather in the encounter between the body and different objects either invested with or surfaced by specific affective meaning through discursive narratives. The specific affective meaning is transferred to our bodies in the instant we encounter the affectively invested or surfaced objects. As such, my concept suggests a three-dimensional focus on affect, discourse, and objects as a means of understanding how affect is evoked and organises and governs social behaviour.

The novel concept of affective governmentality is relevant for understanding the organising and governing operations and effects of aspiration-raising policy because this policy operates, organises, and governs precisely by investing positive affective meaning in the (im)material objects of future times – and

arguably also negative affective meaning in the (im)material objects of past times. Thus, the novel concept of affective governmentality – when one is focusing on the (im)material objects of times – can assist one in gaining new and nuanced ways of analysing and understanding aspiration-raising policy and its organising and governing operations and effects.

Moving from education studies and aspiration-raising policy to OMS, one can further use the novel concept to acquire new understandings of how affective governmentality is performed. As stated in the Theoretical Framework, scholars currently working with affective governmentality are inspired by theory that explains affect as something unrelated to discourse as well as isolated in and to the body. Accordingly, such scholars focus on the abstract, internal 'forces, powers, capacities and intensities through which bodies affect and become affected in organisations' (Kantola et al., 2019, p. 762), when analysing how affect organises and governs social behaviour. My novel concept, on the other hand, allows one to focus on the affective governmentality also performed when concrete, 'external' organisational communication invests particular affective meaning in different objects. As such, my novel concept enables an analysis of the affective governmentality (also) performed when organisational communication, for instance, invests positive affective meaning in the object of innovation, and opposite negative affective meaning in the object of women leaders. This enables my novel concept of affective governmentality to raise new questions about how social behaviour is organised and governed through the production of affect, and to point out that future research could relevantly examine how organisational communication invests various affective meanings in different objects and what organising and governing effects this investment has on the social behaviour of employee subjects.

In an OMS context, the novel concept of affective governmentality can further help one analyse social behaviour in organisations as being organised and governed through more than immediate discursive communication. The concept serves as reminder that objects are never neutral [matters], but rather always surfaced by specific affects that guide subjects' affective reaction and therefore social behaviour towards them. As such, the concept encourages future research, for instance, into how not only discursive communication but also the affective surfaces of the objects of specific employee subjects organise and govern the social interactions occurring between these and other employee subjects. How does the affective surface of specific minority gendered, sexualised, and/or racialised employee subjects impact the interactions between them and majority gendered, sexualised, and/or racialised employee subjects? And how does the affective surface of the leader subject impact the interaction between her and employee subjects? In this way, the novel concept also encourages future research that pays attention to how for instance organisational interactions entail not only immediate communication but also prior – or 'past' – communication that has made certain affects stick to specific subjects.

As a final contribution, I have developed a new material/discursive concept of glitter. The concept is inspired by Coleman's (2020, 2019) work on glitter as producing (positive) affect and (future) time. However, whereas Coleman (2020, 2019) describes glitter as communicating materiality, I argue that glitter is also discursive communication. I contend that glitter is both glittery surfaces and alluring, positive affective sense-makings, and I thus also claim that thinking of glitter as a governing element of affective governmentality makes sense. In turning glitter into an element of affective governmentality, I pinpoint a more sensory aspect of the affect produced by glitter than the more 'internal' affect that Coleman (2020, 2019) specifies. I argue that glitter attracts and reflects light and

thus stimulates the sense of sight by illuminating certain fields, but in so doing it also produces darkness and ignorant blindness. As a result, glitter makes us see, sense, and make sense of a very particular world that organises and governs a very specific social behaviour, as we humans logically act and react in relation to the world we experience. Moreover, I contend that glitter indeed produces better and more desirable futures, but also (potentially dimmer) past, present, and alternative future times that will inevitably diffractively exist in and through the better and more desirable future ones.

Arguing that glitter produces darkness and ignorant blindness while simultaneously producing illumination and enlightening sight – as well as producing (potentially dimmer) past, present, and alternative future times, along with better and more desirable futures – I contend that glitter is a dangerous instrument to utilise in an attempt to organise and govern social behaviour. So, all kinds of troubling dangers could be hiding in glitter's deep shadows, just as various (potentially dimmer) past, present, and alternative future times, could lie unseen in the dazzle of glittery, better, and more desirable futures. However, although these matters and times may be obscured, they still have the potential to trouble what we intend and trust to organise and govern.

This is not to say that troubling dangers necessarily lurk in glitter's shadows, although such dangers have been a focus of this thesis. The danger of glitter could also lie in one overlooking potentially productive matters that might provide new, helpful insights. For instance, one could argue that my critical scrutiny of the dark shadows of glittery STEM has in fact brought forth valuable knowledge that can enhance reflections on how to plan and implement future gendered educational STEM policy. In scrutinising these shadows, I have revealed that girls (also) have a non-stereotypical interest in un-glittery STEM, and that un-glittery elements might be more alluring than glittery ones when it comes to attracting girls to

STEM. I have further shown that darker and more negative past times exist in and through glittery, better, and more desirable futures in STEM, but so do alternative (STEM) futures that allure girls as much as – and maybe even more than – glittery futures in STEM. These findings could indeed help one understand how to better plan and implement policy that helps girls find an enjoyable, satisfying, and rewarding way into STEM. However, this is a point that calls for further research, so for now I will simply state that whether one reads danger as potentially troubling matters or as obscured productive matters, the new material/discursive concept of glitter functions as a clear reminder to search in the shadowy sites that come with what shimmers and shines.

By placing glitter in a context of affective governmentality and emphasising the organising and governing characteristics of glitter, I aim to bring glitter from cultural studies into OMS, where it can hopefully help scholars conduct new and productive analyses of social behaviour – and how it is organised and governed. For instance, the new material/discursive glitter concept could aid in analysing the glittery diversity policy many organisations are implementing to attract a broader range of employees, or the glittery development policy used to motivate global (Western-oriented) progress. To what (sexual/racial and post-colonial) matters do these policies make us ignorantly blind by leaving them in the dark? How does this organise and govern the different affective and temporal worlds that subjects navigate? And how does that organise and govern certain social behaviour? To bring the research down to a micro-organisational level, one could also ask what hides in the dark shadows of glittery performance reports? Could it be a group of over-worked employees? Or the organisational crisis provoked when the intense pressure to perform risks compelling valuable, over-worked employees to resign? Shifting the focus to obscured productive matters, one might ask whether some as yet unnoticed highly talented employees might not deserve a spot in glitter's

reflective light? No matter the insights revealed, they could indeed call for new ways of organising and governing. These are, however, just a few suggestions for how the new material/discursive glitter concept could lead to new relevant knowledge, and my hope is that this concept can provide a useful means of establishing how glitter organises specific worlds and thus governs social behaviour.

# CHAPTER 8
# CONCLUSION

In this chapter, I first summarise my conclusions on the Analysis, findings, discussions, and contributions of the thesis. I then seek to bring a new and overall thesis finding to the field of policy practice, which I hope the field can use to reflect on the further work of balancing men's and women's representation in the general gender-segregated labour market. In this connection, I return to the Introduction, where I stated a thesis aim of providing insights into the more general issue of the gender-segregated labour market and the problems policy faces in trying to address this issue.

**8.1 Summarising Conclusion |** Taking a Barad-inspired, ethico-epistem-ological position, in this thesis I have asked: how does gendered educational STEM policy organise and govern girls' STEM aspirations? And what implications might this have? My answer has been guided by three further questions: (1) How does gendered educational STEM policy attempt to organise and govern girls' STEM aspirations through productions of affect and time? (2) Which futures does gendered educational STEM policy organise, and how do these condition gendered subjectivity? And (3) in what ways do girls' affectively and temporally relate to STEM? I have argued that gendered educational STEM policy attempts to organise and govern girls' STEM aspirations by producing discursive narratives that invest positive affective meaning in the (im)material objects of future times. As such, gendered educational STEM policy attempts to organise and govern girls' STEM aspirations by producing glittery, better, and more desirable futures for girls in STEM. I have further argued that these glittery, better, and more desirable futures condition a new glittery, gendered subjectivity that ascribes an interest in beauty and/or caring practices to girls. Consequently, gendered educational STEM policy has created new glittery opportunities for being a girl in STEM, and a new type of girl perhaps once unable to identify with male-dominated, 'geeky' STEM can now potentially feel included and thus

attracted to STEM. Lastly, I have argued that girls relate to STEM in affectively and temporally unique and mixed ways not immediately comparable to the affects and times the policy produces. Using these arguments, I have stated that gendered educational STEM policy organises and governs girls' STEM aspirations by (1) producing glittery, better, and more desirable STEM futures, (2) organising STEM futures that condition a new glittery, gendered subjectivity, and (3) not organising and governing girls' STEM aspirations.

However, I have also argued that in producing glittery, better, and more desirable futures, gendered educational STEM policy does more: it simultaneously produces less attractive, darker, and more negative past times that diffractively exist in and through the glittery, better, and more desirable futures. To this should be added that, in producing futures that condition a new glittery, gendered subjectivity, gendered educational policy not only – potentially – includes and attracts a new type of girl to a future in STEM, but also excludes and dissuades some girls from STEM. Not all girls are attracted to STEM because of glittery shimmer and shine, rather some girls are attracted to it by un-glittery matters like fixed rules. Thus, gendered educational STEM policy seeking to make un-glittery STEM glittery will not only positively organise and govern girls' STEM aspirations but undeniably also the opposite. On the basis of these findings, I therefore conclude that gendered educational STEM policy is highly over-productive and thus over-efficient in organising and governing what it intends to and, certainly, also what it does not.

In trying to answer the thesis' research question(s), I have found inspiration in aspiration formation literature, more specifically the literature on aspiration-raising policy, affective governmentality, and glitter. Moreover, I have sought to contribute to these different bodies of literature by (1) questioning the temporal understanding of aspiration formation conveyed in the literature on aspiration-

raising policy, (2) developing a novel concept of affective governmentality, and (3) developing a new material/discursive concept of glitter.

In questioning the temporal understanding in the literature on aspiration-raising policy, I contend that it makes sense to think of aspirations as being organised and governed within 'ghostly' (Pors, Olaison & Otto, 2019; Derrida, 1994, 1999) – or diffractively existing (Barad, 2007, 2013, 2017) – times. As such, I demonstrate how aspiration-raising policy in the form of gendered educational STEM policy produces more than better and more desirable futures, as ostensibly argued by the current literature on aspiration-raising policy, for the policy similarly produces darker and negative past times while seemingly also constituting aspirational learning spaces where girls' aspirations are organised and governed within an unruly affective and temporal disorder.

My novel concept of affective governmentality mirrors other scholars' work on affective governmentality by pointing out the importance of focusing on affect when one analyses the organisation and governance of social behaviour. However, my concept also differs from theirs because I explicitly focus on discourse and objects in addition to affect. As such, my concept implies that affect is evoked through the production of discursive narratives that create affective meaning that either sticks to or is invested in different objects. Such affective meaning is transferred to us in the instant we encounter the objects, while affective governance of behaviour also takes place in the encounter between our bodies and affective objects.

I have argued that the concept is especially useful for understanding the organising and governing operations and effects of aspiration-raising policy, which explicitly operates by producing discursive narratives that invest affective meaning in the objects of times. However, I have also argued that the concept can contribute to

new research in OMS as it allows for a new focus on the role organisational communication plays in the performance of affective governmentality. As such, the new concept paves the way for research on how social behaviour is organised and governed, for instance, through the affective meaning organisational communication invests in objects such as women leaders or diversity. Moreover, it enables one to analyse how organisational interactions are a matter of not only immediate communication but also prior – or 'past' – communication that has made certain affects stick to specific subjects. As such, the novel concept of affective governmentality provides a reminder that social encounters are always more complex than thought at first glance.

My new material/discursive concept of glitter is inspired by Coleman's (2020, 2019) work on glitter as something that produces (positive) affect and (future) time. However, whereas Coleman (2020, 2019) describes glitter as communicating materiality, I argue that it is also discursive communication. I contend that glitter is both glittery surfaces and alluring, positive affective sense-makings, while I also claim that seeing glitter as a governing element of affective governmentality makes sense. In making glitter an element of affective governmentality, I pinpoint an aspect of the affect glitter produces that is more sensory than the more 'internal' positive affect Coleman (2020, 2019) describes. I argue that glitter attracts and reflects light and thus stimulates the sense of sight by illuminating certain fields, but in doing so it produces not only illumination but also darkness and ignorant blindness. Accordingly, glitter makes us see, sense, and make sense of a very particular world that organises and governs very specific social behaviour, as we humans logically act and react in relation to the world we experience. Moreover, I have argued, glitter indeed produces better and more desirable futures, but also (potentially dimmer) past, present, and alternative future

times, which will inevitably diffractively exist in and through the better and more desirable futures.

In contending that glitter produces darkness and ignorant blindness as well as illumination and enlightening sight – and (potentially dimmer) past, present, and alternative future times, along with glittery, better, and more desirable futures – I state that glitter is a dangerous instrument to wield in trying to organise and govern a certain social behaviour. Consequently, just because we see, sense, and make sense of one glittery world of glittery futures does not mean that other co-existing (darker) worlds and times are not present to organise and govern social behaviour that potentially counters the very social behaviour sought organised and governed.

For instance, when policy organises glittery, better, and more desirable futures for girls in STEM, we might become ignorantly blind to the (potentially dimmer) past, present, and alternative future times it also organises. Alternatively, when policy produces new glittery options for being a girl in STEM, we might become ignorantly blind to the fact that these options also limit the options for being a girl in STEM. Hence, when gendered educational STEM policy sprinkles glitter to alluringly attract more girls to STEM, the policy might blind us to its over-efficiency in organising and governing not only its intended effects, but also the unintended effects that might actually counter those intended. As such, the policy could organise and govern a blinded behaviour of passiveness among policy actors – as well as the rest of us – even though we might do well to plan and implement more constructive policy that ensures more girls feel celebrated, included, and welcome in STEM.

Since gendered educational STEM policy organises and governs what it is both intended and not intended to, definite conclusions about where this takes us are

hard to draw. Glittery STEM could result in more girls' aspiring to STEM or maintain – even worsen – the status quo. Although, it is difficult to draw conclusions about the final organising and governing effects of gendered educational STEM policy, I still think one can conclusively answer the question asked by Pete Doherty (2005) in the beginning of this thesis: 'Broken glass. It's just like glitter, isn't it?' Indeed, when it is asked in a glittery STEM context, the answer is a resounding 'Yes!' Like broken glass, glittery STEM is dangerous and can harm us by misleading us into trusting that the issues of girls' and women's STEM interests, representation, and participation are moving in the right direction, when perhaps they are not.

**8.2 Bringing Findings to Practice |** In this short section, I emphasise a last finding of the thesis that relates to the gender segregation in STEM as well as more broadly in the global labour market. As such, I aim to bring new and further insights to the problems policy faces in trying to address the issue that women and men generally occupy very different jobs, work functions, and work positions. This thesis demonstrates how gendered educational STEM policy attempts to solve the issue of gender segregation in STEM by sprinkling it with feminised material as well as discursive glitter – glitter used with the intention of alluring girls and women to STEM. Moreover, the thesis illustrates how gendered educational STEM policy deploys a range of ultra-glittery – almost stereotypical – images of girls and women. The policy presents girls and women as subjects interested in matters like make-up, beauty products, and shiny surfaces – and maybe also 'harder' STEM opportunities such as vaccine development, albeit by way of play with Barbies in glimmery mini-dresses and high heels. Thus, it seems fair to argue that gendered educational STEM policy attempts to solve the problem of the gender segregation in STEM by hyper-feminising the field.

As stated in the Introduction, STEM is but one of many gender-segregated fields identifiable in the global labour market. Leadership, for example, is a gender-segregated field that has recently also received great attention. According to the United Nation's (UN, 2021) global figures on public and government leadership, in September 2021 only 26 women served as heads of state or government, only 10 countries had a woman head of state, and only 21% percent of government ministers were women. In only 14 countries did 50% or more of women hold cabinet positions. Globally, the figures are similarly low in the private sector. In 2019, the percentage of women in senior management reached 29%, the highest recorded, but in 2020 that figure remained roughly the same. Neither could any progress for women in leadership overall be traced from 2019 to 2020 (Catalyst, 2020).

Thus, STEM is neither the only field where women are highly underrepresented compared to men, nor the only field where policy is planned and implemented to ensure a greater balance between the two. However, whereas the solution to the gender segregation in STEM seems to be hyper-feminising the field and encouraging girls and women to adopt a highly feminine behaviour, the opposite seems to be true for other gender-segregated fields. Indeed, in the gender-segregated field of leadership, nurturing hyper-masculinity and encouraging women to behave highly masculine appears to be the solution.

My own work on a mentoring programme implemented as part of a unionised gender equality policy shows that the programme tried to bring more women into leadership and management positions by encouraging them to adopt a highly masculine behaviour. The mentoring programme recommended that women adopt such masculine behaviour as assertiveness, rationality, and a low prioritisation of social and family life. The women were also advised to abandon such feminine behaviour as being nice, showing emotions, and prioritising family, for instance,

by picking up children early from daycare or attending school events (Sandager, 2021). As such, the mentoring programme directly encouraged women to abandon feminine behaviour in favour of masculine behaviour as a strategy for ensuring more women in leadership positions.

Other findings on policy initiatives planned and implemented to overcome gender segregation in leadership similarly point to these initiatives as attempting to 'fix women' by encouraging them to adopt a masculine behaviour that can make them recognisably 'true' leaders (Leenders et al., 2019; see also Ely & Meyerson, 2000; Meyerson & Kolb, 2000). For instance, Muhr (2011) has argued that in order to become recognisable as subjects that belong in leadership, women are asked to abandon a caring and maternal behaviour, and instead become rational and intelligent 'machines' (p. 338). Moreover, Marshall (2011) has contended that, to enter leadership women have to forsake feminine behavioural traits and submit to patriarchal structures because male behaviour is seen to signify real leadership. Hence, the solution to the gender segregation in the field of leadership entails neither hyper-feminising the field nor encouraging women to behave in highly feminine ways – quite the contrary.

This finding that the field of STEM seeks to balance women's and men's representation with hyper-femininity and that the field of leadership does so with hyper-masculinity is interesting because it raises questions about why STEM took the hyper-femininity path while other gender-segregated fields went the way of hyper-masculinity? What differences between the fields of STEM and leadership motivate different solutions to their almost identical problem of gender segregation? How do the two strategies differ in effect? Which strategy is more and which less efficient? What dangers do the different strategies pose? What would solutions other than hyper-femininity and hyper-masculinity look like? Could the challenge of a gender-segregated labour market be tackled in non-

gendered ways? Can we avoid reproducing the very gendered stereotypes that ostensibly lead to gender segregation? Is there a way to ensure that we can enter the labour market not as women nor as men but just as humans? I urge the field of policy practice to ask itself these questions and pay attention to the potential answers, as answering such questions can provide vital knowledge on how best to plan and implement new policy that supports both women and men in overcoming the obstacles to achieving equal representation in the labour market's gender-segregated fields.

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