Symbolic power, discourse, and underrepresentation of women in IT

Tanya Jurado, Alexei Tretiakov and Jo Bensemann
Massey University, Palmerston North, New Zealand

Received 14 January 2021
Revised 29 September 2021
26 February 2023
Accepted 21 May 2023

Abstract

Purpose – The authors aim to contribute to the understanding of the enduring underrepresentation of women in the IT industry by analysing media discourse triggered by a campaign intended to encourage women to join the IT industry.

Design/methodology/approach – Internet media coverage of the Little Miss Geek campaign in the UK was analysed as qualitative data to reveal systematic and coherent patterns contributing to the social construction of the role of women with respect to the IT industry and IT employment.

Findings – While ostensibly supporting women's empowerment, the discourse framed women's participation in the IT industry as difficult to achieve, focused on women's presumed "feminine" essential features (thus, effectively implying that they are less suitable for IT employment than men), and tasked women with overcoming the barrier via individual efforts (thus, implicitly blaming them for the imbalance). In these ways, the discourse worked against the broader aims of the campaign.

Social implications – Campaigns and organisations that promote women's participation should work to establish new frames, rather than allowing the discourse to be shaped by the established frames.

Originality/value – The authors interpret the framing in the discourse using Bourdieu's perspective on symbolic power: the symbolic power behind the existing patriarchal order expressed itself via framing, thus contributing to the maintenance of that order. By demonstrating the relevance of Bourdieu's symbolic power, the authors offer a novel understanding of how underrepresentation of women in the IT sector is produced and maintained.

Keywords Underrepresentation of women, IT industry, IT employment, Framing, Bourdieu's symbolic power

Paper type Research paper

1. Introduction

The information technology (IT) workforce in developed countries, such as the UK, remains overwhelmingly male, with the underrepresentation of women persisting over time (Ahuja, 2002; Charlesworth and Banaji, 2019; Trauth and Howcroft, 2006). The situation in the UK is illustrated in Figure 1, which is based on data provided by the UK Office for National Statistics (2021). As seen in the figure, even though women are underrepresented in the workforce as a whole, their underrepresentation in the IT industry is much more pronounced, and there is no clear improvement trend. The underrepresentation is particularly strong in occupations relying on technical expertise, such as software developers, but it is clearly evident in all IT occupations. In other developed countries, there is a similar underrepresentation of women, as revealed in the data for year 2018 covering 41 countries in the OECD and EU compiled by Honeypot (2018): the percentage of women in the IT industry ranged from 9% in Slovak Republic and 10% in Turkey to 28% in Australia and 30% in Bulgaria, with the UK in the lower-middle part of the range at 16%. Even though India is often mentioned as a country where women underrepresentation in IT is less pronounced Gorbacheva *et al.* (2018), the corresponding number in India in 2018 was 34% (Ring, 2018), thus, better, but not dramatically better than in Australia and Bulgaria, and far below 50%.

Declaration of conflicting interests: The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

0959-3845
DOI 10.1108/ITP-01-2021-0060

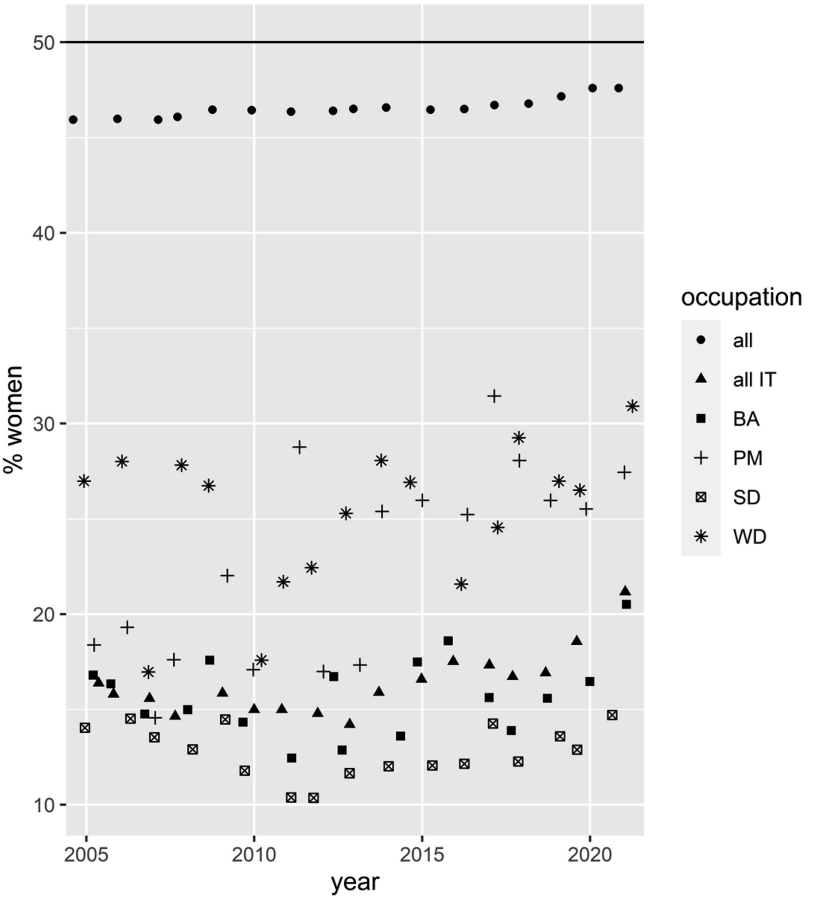

Figure 1.
The percentage of women in the IT workforce in the UK by occupation

Note(s): all = workforce as a whole (all industries); all IT = all of the IT industry; BA = IT business analysts, architects and systems designers; PM = IT project and programme managers; SD = programmers and software development professionals
Source(s): Author's own creation/work; Based on (Office for National Statistics, 2021)

Even though a number of interventions intended to redress the imbalance have been implemented (such as the ongoing Women in IT event series organised by Information Age, https://womeninitawards.com), they were unable to effect change. We aim to contribute to a better understanding of the reasons for this inefficacy by analysing the 2013 Little Miss Geek campaign in the UK (henceforth, LMG campaign). The study addresses the following research question: How does the internet media discourse triggered by a campaign intended to encourage women to participate in the IT industry work to undermine (openly or tacitly) the broader aims of the campaign to reduce gender inequality in the industry?

We use Bourdieu's concept of symbolic power (Bourdieu and Thompson, 1991; Grenfell, 2014; Lumsden and Morgan, 2017; Shoib *et al.*, 2009) to analyse the LMG campaign's online media trail. The study contributes to theory by demonstrating how interventions intended to redress the negative consequences of gendered role construction may evoke discursive

responses that are framed to emphasise and justify role definitions, thus acting to re-affirm and possibly even strengthen the disparity. We argue that framing the discourse in this way constitutes a subtle expression of Bourdieu's symbolic power: the deployment of established categories that express implicit social habits, differentiations, and assumptions ostensibly to criticise the established patriarchal order ends up reproducing it.

The remainder of this article is organised as follows. First, we introduce the theoretical background of the study in a literature review. Then, we describe the details of the data set and the research method. The analysis of findings is followed by a discussion and conclusion section, which focuses on the negative framing discovered in the analysis.

2. Literature review

At the inception of the IT industry, after the Second World War, women participated in the industry in large numbers, albeit not in management roles (Hicks, 2017; Vehvilainen, 1999). A mere decade ago, even as the decline in women's participation was evident, the discourse of the "old times" when women appeared to be a majority was still alive in the IT industry (Crump *et al.*, 2007). This narrative, maintained by older women workers, was associated mainly with legacy technologies, such as mainframe computers and the COBOL programming language. The women to men ratio in IT has decreased over time, as computing shifted from the women-dominated domain of clerical work to the male-dominated domain of engineering (Demaiter and Adams, 2009; Fountain, 2000).

Through their absence, women are prevented from actively exercising influence on the future of IT at a global level, exacerbating gender inequity (Howcroft and Trauth, 2008) as technology is being shaped by males to suit male preferences (Moody *et al.*, 2003). Because women are important stakeholders in IT design, their insufficient participation in this sector disadvantages organisations, the IT industry, women, and society in general.

At the organisational level, IT/information system configurations influence the way work is done and how power is distributed (Sia *et al.*, 2002). Thus, women also miss out on influencing organisational processes. At the individual level, women miss out on job opportunities in a well-paying sector (Valk and Srinivasan, 2011) and on opportunities to balance family and work lives, as IT work is often project-based and could potentially be organised in flexible ways to meet family needs. However, this same flexibility can be abused, as workers may be pressured to work overtime (Riemenschneider *et al.*, 2006; Soe and Yakura, 2008). Indeed, women who become IT professionals face high levels of work/family conflict, resulting in high rates of voluntary turnover (Armstrong *et al.*, 2007; Trauth *et al.*, 2009; Wijayawardena *et al.*, 2017).

Further, from the competitiveness and human resource utilisation perspectives, the effective exclusion of a large pool of potentially highly talented individuals from participation in the IT industry restricts the industry's ability to contribute to economic growth and, ultimately, to society's well-being and development (Charlesworth and Banaji, 2019; Moody *et al.*, 2003).

Studies of the effects of gender in the IT industry are commonly distinguished by the perspectives on gender they employ: essentialist, social constructionist, or individual (Trauth, 2013; Gorbacheva *et al.*, 2018). A similar classification can be applied to practitioners' theories-in-use (Ridley and Young, 2012). Essentialist studies regard gender differences as biologically predetermined, and thus not susceptible to change. Very few, if any, studies explicitly make such an assumption, and occasionally studies that do not explicitly explain the reasons behind the differences, such as (Truman and Baroudi, 1994) and (Igbaria and Baroudi, 1995), are criticised as essentialist, even though their results are not incompatible with other gender theories. Social constructionist theory of gender suggests that gender

differences are formed as the result of individuals' development in a social context and thus can be altered by altering the social context (Trauth, 2013; Miner *et al.*, 2018). Finally, individual differences theories of gender emphasise the differences between individuals and groups of individuals belonging to a particular gender (e.g. differentiating white women and women of colour) (Kvasny *et al.*, 2009). Such differences may have complex effects: for example, the recent study by Alfrey and Twine (2017) found that women who identified as LGBTQ (lesbian, gay, bisexual, transgender, and queer/questioning) had greater sense of belonging in their workplaces than straight women, possibly because they did not fit the stereotype of a typical female.

By and large, research into women's participation in IT has rejected essentialist assumptions and concluded that the existing patriarchal order is the result of a social construction, and thus potentially can be corrected (Trauth, 2013). Comprehensive reviews by Ceci and Williams (2010) and Charlesworth and Banaji (2019) concluded that, on balance, even though differences in cognitive abilities between genders do exist, women's participation in STEM (Science, Technology, Engineering, or Math) professions (including IT) cannot be explained by such differences and has to be attributed to social factors. Further, women as individuals cannot be tasked with overcoming such social factors, no matter how successful in the IT industry some individual women are; rather, to redress the imbalance a social/structural change is needed (Miner *et al.*, 2018).

From the perspective of relativist social constructionism (Burr, 2003), societal structures, such as family or organisation, or cognitive states, such as attitudes, are socially constructed via discourses: discourses structure our interpretation of our perceptions so that we distinguish these entities and concepts. As the prevailing discourses change, discernible concepts also change. From this perspective, society can be fully understood by studying discourses, and there is no need to infer concepts or structures existing beyond discourse. In contrast, realist social constructionism is more conciliatory with respect to conventional sociology and psychology and recognises the existence of and our ability to have knowledge of concepts and structures beyond discourse, while still recognising the power of discourse to influence the social construction of such concepts and structures.

Social constructionism suggests that female gender is constructed by offering (or not offering) women positions/roles in dominant discourses (Burr, 2003; Willig, 1999). When positions/roles offered for women in a particular context are weak (or are not available), women are disempowered and excluded. For example, Lin and den Besten (2019) studied the discourse in a bug tracking system used by Mozilla Firefox web browser developers and found that the discourse strongly relied on cultural references specific to male developers, thus offering no comfortable position for women developers, effectively constructing a workplace excluding them. Ridley and Young (2012) analysed the discourse around women in IT in Australian newspapers and found that it was overall consistent with the essentialist view of gender, thus implying that under-representation of women in the IT industry reflects their attributes that cannot be changed and offering women a position that keeps them outside the industry. Guerrier *et al.* (2009) analysed the transcripts of interviews of managers in the IT sector and discovered the prevalence of a "soft-skills" discourse based on an essentialist view that women are less than men capable to fill roles relying on technical knowledge, thus constructing a position for women that excluded them from technical work.

Studies have observed that attempts by organisations to engage in "gender neutral" recruitment practices may fail to address gender inequality (Ozkazanc-Pan and Clark Muntean, 2018), as networks of men providing access to institutional knowledge and high status contacts remain closed to women (a recent result by Langer *et al.* (2020), however, suggests that, to an extent, women can counter this by investing more time in formal training). Further, women promoted to higher positions may adopt queen bee attitudes, blending into the existing patriarchal order rather than working for positive change, and

might work, intentionally or unintentionally, to bar other women advancing (Derks *et al.*, 2016). Thus, attempts to redress gender inequality may encounter social dynamics that render them ultimately ineffective. We follow McCall (1992), Elliott and Stead (2018), and Lumsden and Morgan (2017) in interpreting such social dynamics as expressions of Bourdieu's symbolic power.

According to Bourdieu (Bourdieu and Thompson, 1991; Grenfell, 2014), social inequalities are produced and maintained less by tangible (physical or economical) force than by forms of symbolic power/violence based on language. Systems of classification and patterns of reasoning that are historical and culturally rooted appear to human actors as the natural and only possible way of viewing the social world and are embedded in their subconsciousness. Moreover, by engaging in reasoning using such established patterns, human actors suffering from social inequality contribute to reproducing the inequality, and thus are unwittingly complicit in their own suffering. Symbolic power/violence, therefore, offers a highly effective and efficient form of domination, as those interested in maintaining the inequalities need to exert very little energy to maintain them.

Framing is defined as "selecting some aspects of a perceived reality and making them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described" (Entman, 1993, p. 53). Symbolic power may present itself as subtle framing in the discourse, with distinctions favouring the established order made more salient using devices such as emphasis and repetition (Bourdieu and Thompson, 1991; Kramsch, 2016).

Symbolic power/violence has been used to reveal the meanings of media discourses about gender in several studies. Lumsden and Morgan (2017) found that media advice to women victims of misogynist attacks on social media to ignore such attacks ("do not feed the troll") silences the victims, thereby implying they should accept (and, consequently, contribute to the maintenance of) the status quo. Gray *et al.* (2017), who did not cite Bourdieu's work, used the term symbolic violence to describe social media attacks on prominent women gamers by their male counterparts - attacks provoked either by the women gamers' seeming lack of fit with the masculine gaming culture, or by their feminist views. Paradoxically, while Gray *et al.* (2017) presented the attackers in a strongly negative light, they unwittingly extended their reach by publishing links to the text of some of the attacks. Finally, Udasmoro (2013) relied on the concept of symbolic violence to characterise patterns and plots encountered on Indonesian television that normalise behaviours and practices that maintain the subordinate position of women in society; for instance, women's passivity in response to the practice of polygamy by men. However, the symbolic power/violence in on-line discourses around women's participation in the IT industry received little attention in prior research, and the present study contributes to addressing this knowledge gap.

Viewing discourse from Bourdieu's symbolic power perspective, one may anticipate that discursive responses in the internet media to a campaign intended to encourage women to participate in the IT industry will be coloured by manifestations of the symbolic power of the prevailing patriarchal order, even in media articles that support the campaign. Hence, the research question of the present study initially stated in the Introduction: "How does the internet media discourse triggered by a campaign intended to encourage women to participate in the IT industry work to undermine (openly or tacitly) the broader aims of the campaign to reduce gender inequality in the industry"?.

It is important to address this research question because exposure to Internet media discourses has been demonstrated to have profound effects on human attitudes and behaviours (Xenos and Moy, 2007; Daine *et al.*, 2013; Bennett and Seyis, 2021), including women's fertility intentions (Liu *et al.*, 2021) and women's participation in the labour force (Dettling, 2017). While the campaign itself had a limited scope in time and in space, the internet based media triggered by the campaign is freely accessible worldwide and

persists over time, generating secondary content as it is indexed and summarised. For example, in January 2023, the highly influential ChatGPT system (https://chat.openai.com) trained using a dataset containing Internet media items triggered by the campaign was able to reason about the campaign and to engage in an AI chat about it.

3. Material and method

Drawing on the social constructionism perspective (Burr, 2003; Alvesson and Karreman, 2000), the present study focused on understanding how the role/position of women with respect to both the IT industry and to employment in IT is framed and constructed in an Internet media discourse prompted by a highly visible campaign intended to remedy the underrepresentation of women. Thus, we did not study the campaign itself, but focused on its coverage, arguing that Internet coverage of a campaign (unlike the campaign itself) is global in its reach and is persistent in time, and thus deserves interest in its own right.

Following Henttonen *et al.* (2013), we understand discourse as "systematic and coherent ways of speaking and representing" (p. 60) objects and relationships in the social world resulting in social construction of societal and organisational phenomena (Vaara and Tienari, 2002). In analysing discourse, we do not make assumptions regarding the motives of the originators of media artefacts and do not focus on their personal characteristics. Rather, we regard texts (and any recorded media) as functional, that is, as carrying meanings, and, as such, possessing the potentiality of effects quite independently from the conscious intentions of their originators (Alvesson and Karreman, 2000; Grant *et al.*, 2004). In this respect, our perspective is similar to Bourdieu (2001), who depicts symbolic power/violence as acting on its own, without explicitly attributing its dynamics or assigning responsibility/blame to individual actors or groups (such as men and women). We analyse the online discourse (Levina and Arriaga, 2014), but we are not concerned with (and, indeed, have little information about) the social positions of the individuals participating in the discourse. In terms of the distinction between individual-level and social-structural explanations of gender inequality in STEM employment suggested by Miner *et al.* (2018), we employ a social-structural lens and focus on discourse because it forms part of the social context in which the position of women with respect to IT employment is formed.

In analysing the internet media coverage of the LMG campaign, we focused on systematic and coherent patterns that contributed to the social construction of the social positioning (Bourdieu, 2001; Ignatow and Robinson, 2017) of women with respect to the IT industry and IT employment, taking a view that such construction contributes to the broader discourse about women and IT that, in turn, has a potential to influence women's career decisions. At the same time, the present study shares a limitation with other studies involving analysis of discourse (Elliott and Stead, 2018; Heizmann and Liu, 2018; Henttonen *et al.*, 2013; Lang and Rybnikova, 2016; Liu, 2017; Mavin *et al.*, 2016; Naidoo *et al.*, 2019) by focussing solely on the patterns and meanings emerging in the discourse, as isolating the effects of discourse generated by a single campaign on society at large is hardly practicable.

We chose a campaign relatively remote in time (the campaign took place in 2012 and 2013, while the analysis was conducted in 2019), so that any discourse in the internet media around the campaign was fully formed. Further, we chose a campaign that had a relatively high profile, attracting the attention of the internet media. Finally, the campaign had a unique name ("Little Miss Geek"), making it easy to search for its Internet media coverage using the Google search engine. The analysis did not focus on a particular type of a source, such as blogs. Rather, all freely accessible items discoverable by Google search were included (including videos). At the same time, sources that were not in open access via the internet, in particular, the book by Belinda Parmar (2012), were not included as not forming part of the open discourse accessible worldwide.

The purpose of the present study was to study the discourse, not the LMG campaign itself. The researchers did not take part in the campaign, were not in contact with the organisers, and were geographically located in New Zealand, a context remote from the UK, where the campaign took place. The LMG campaign is summarised in the Appendix; however, we emphasise that its evaluation was not the purpose of the present study, which focused exclusively on the internet media coverage of the campaign. Thus, the conclusions of the present study should not be interpreted as passing judgement on whether the campaign was successful in achieving its immediate goals to raise girls' interest in IT careers, a common practice in evaluating campaigns of this type (Craig, 2016). Having occurred in 2013, the campaign itself is of historic interest; however, the discourse around the campaign is of current relevance as it remains accessible over the internet, contributing to, and exemplifying, the broader discourse about women and IT. The focus of this study is on the discourse around the campaign.

An initial Internet search for "Little Miss Geek Campaign" via the Google search engine resulted in 330 media items referring to the campaign. These were examined to identify items that went beyond simply reporting that the campaign was taking place by providing, for example, evaluation or analysis. This resulted in 44 media items being retained for the analysis (see Table 1). Most of these were published during, or immediately after, the campaign period (2012–2013).

The majority of the media items retained for analysis were news articles in online magazines, although there were also some blog entries and YouTube videos. Several of the media items originated directly from the LMG campaign. Most of the coverage originated in the UK, and some international coverage was from the USA and from subsequent international campaigns that were modelled on and/or inspired by the LMG campaign. Text based media items were analysed directly as text, while videos were transcribed and were analysed as text. The possibility of analysing images (as has been done by Liu (2017)) was considered; however, images (both video and static) were found to carry little information relevant to the research question of the present study. Thus, the analysis was limited to text and video transcripts. The size of the items ranged from about 100 to about 1000 words, with an average item of about 700 words.

Following Braun and Clarke (2006), the analysis involved three phases, focused, respectively, on transcription and holistic appreciation of the text, on initial coding, and on higher-level coding. The phases were executed iteratively, rather than in sequence. Phase 1 involved transcribing video-based items and repeatedly re-reading the text or all items, taking notes to capture ideas for subsequent coding. Phase 2 involved generating initial codes, highlighting statements carrying implications for the role of women with respect to the IT industry and IT employment. Finally, in Phase 3 codes were organised into themes, themes were refined to ensure internal homogeneity (internal coherence) and external heterogeneity (clear distinctions between themes), and the insights obtained were presented in textual form.

While executing Phase 2 and Phase 3, the analysts noted the relevance of Bourdieu's concept of symbolic power to interpreting the results. Thus, the focus on Bourdieu's symbolic power emerged inductively later in the analysis.

Phases 1 and 2 were primarily conducted by the first and the second author, while all authors were involved in Phase 3, with perspectives aggregated via discussion. The perspectives of the authors were complementary, with the second author, a male, having a background in information technology, and the remaining two authors, women, having a background in entrepreneurship and women's studies. In integrating the perspectives the focus was on combination and on mutual reinforcement, rather than on agreement, as suggested by Pratt *et al.* (2020).

4. Findings

Findings are presented here under three main themes identified in the analysis: women being left behind by the rapid rate of change in IT, the education system not coping in the face

ID	Date	Title	Media type	Author	Publisher/platform
[1]	18/09/2012	Targeting lucrative female market is growing trend	news article	Nick Martindale	RACONTEUR
[2]	1/10/2012	Why are so few women working in technology?	news article	Jemima Kiss	The Guardian
[3]	8/10/2012	Kicking myself as Lady Geek catches the IT bug	news article	Rebecca Armstrong	INDEPENDENT
[4]	10/10/2012	Little Miss Geek	blog entry	Anne J Simmons	Personal blog
[5]	12/10/2012	More women needed in technology	news article	Belinda Parmar	BBC
[6]	22/10/2012	We are the Geeky Girls: The mission to get girls creating gadgets	news article	metrowebukmetro	METRO
[7]	2013	Little Miss Geek	news article	–	MISSOURI parent
[8]	25/01/2013	Changes in attitudes needed to drive gender diversity	news article	Kayleigh Bateman	ComputerWeekly.com
[9]	7/03/2013	Computer Coding: It's not just for boys	news article	Beth Gardiner	The New York Times
[10]	7/03/2013	LMG campaign offers tech-inspiration for girls	news article	Andy Robertson	Forbes
[11]	8/03/2013	Girl Gamers Transform "Pizza-Loving Nerd" Image	news article	Naomi Kerbel	Sky News
[12]	8/03/2013	Gadgets aren't just for guys: Lady Geek want girls to get gaming. GoThinkBig	news article	Stevie Martin	Go Think Big
[13]	8/03/2013	Will the next Zuckerberg be female?	news article	Jane Wakefield	BBC
[14]	9/03/2013	The 25 pound computer which is teaching British children to code	news article	Jonathan Weinberg	Yahoo! News
[15]	11/03/2013	We are thrilled to have received . . .	blog entry	Lady Geek	Facebook
[16]	13/03/2013	Little Miss Geek ICT School Takeover	news article	Jamie Cook	Mm
[17]	20/03/2013	Why girls should be geeks too	news article	Rebecca Armstrong	INDEPENDENT
[18]	20/03/2013	Lady Geek ICT School Takeover	video	ladygeektv	YouTube
[19]	26/03/2013	Heading back to school-Little Miss Geek ICT School Takeover	blog entry	Claire Vyvyan	LMG Blog
[20]	18/04/2013	The world of women in tech: What have I missed?	news article	Kayleigh Bateman	ComputerWeekly.com
[21]	24/04/2013	Fashion And Technology Collide At Unique Workshop	news article	Ella Alexander	VOGUE HOPE
[22]	26/04/2013	Little Miss Geek Event Gets Girls Interested In Technology	news article	MARIE CLAIRE	MARIE CLAIRE
[23]	29/04/2013	The future of fashion	news article	Stephanie Hirschmiller	INDEPENDENT

Table 1.
Media items analysed

(*continued*)

ID	Date	Title	Media type	Author	Publisher/platform
[24]	2/05/2013	Little Miss Geek Wearable Tech Event	video	ladygeektv	YouTube
[25]	13/07/2013	It's Geekness Day!	blog entry	Nicki Cooper	interactiveclassroom.net
[26]	16/07/2013	Is wearable technology the answer to get more girls in tech	blog entry	Belinda Parmar	HUFFPOST
[27]	8/09/2013	Learning to code: How advanced computer skills could really boost your career	news article	Hannah Langworth	INDEPENDENT
[28]	13/10/2013	Belinda Parmar and Zea Tongeman on BBC World News talk about Little Miss Geek Tech Clubs	video	ladygeektv	YouTube
[29]	15/10/2013	Ada Lovelace Day: A celebration of the world's first computer programmer	news article	Ross McGuinness	METRO
[30]	15/10/2013	Putting the HER in Hero: why we need more tech superwomen	news article	Belinda Parmar	The Guardian
[31]	15/10/2013	Being a tech geek is cool, I should know, I am one	news article	Zea Tongeman	The Guardian
[32]	15/10/2013	Ada Lovelace Day 2013: from nerd cabaret to womenifying Wikipedia	news article	Suw Charman-Anderson	The Guardian
[33]	16/10/2013	Commemorating Ada Lovelace - the first computer programmer	blog entry	Debbie Abrahams	Member of Parliament blog
[34]	17/10/2013	14 y/o says "Geeks are cool" and creates innovative app to prove it	news article	WORKING WOMEN	GIRLTALKHQ
[35]	4/12/2013	Rising Star: Belinda Parmar, founder of Little Miss Geek, and CEO of Lady Geek	news article	Caroline Baldwin	ComputerWeekly.com
[36]	8/01/2014	Little Miss Geek	news article	Hetty Mosforth	Moving On
[37]	8/01/2014	50 Unsung Heroes to Watch in 2014	blog entry	Marieme Jamme	Personal blog
[38]	4/02/2014	More ladies in tech: What is Europe doing to change the ratio?	news article	Alex Barrera	techeu
[39]	6/10/2014	Fortune's 55 most influential women on Twitter	news article	Caroline Fairchild *et al*	Fortune
[40]	10/02/2015	'Sometimes you need that raw, unfiltered feedback'	news article	Janet Murray	The Guardian
[41]	12/04/2016	"Lady Geek" in drive to draw more women to technology	news article	Zoe Tabary	Reuters

(*continued*)

Table 1.

ID	Date	Title	Media type	Author	Publisher/platform
[42]	25/05/2016	Lady Geek, and Little Miss Geek – Inspiring Perspectives	video	Inspiring Fifty	YouTube
[43]	4/08/2016	Little Miss Geek - Belinda Parmar (2012)	news article	Jannat Shah	Medium
[44]	8/12/2016	Belinda Parmar: Little Miss Geek	news article	Sherine Ramadan	SCIplanet

Table 1. **Source(s):** Author's own creation/work

of these technological developments, and the pervasiveness of stereotypes around women's participation in the IT industry.

4.1 Women are being left behind

The coverage of the LMG campaign focused often on how low participation in the IT sector disadvantages women as a group, even rendering women as second-class citizens in a world driven by IT developments and innovations. The common starting point was the statement by the founder of the campaign that at the time 30% of the best paid jobs in the UK were situated in the technology industry, while only 17% of these jobs were held by women (e.g. "Ms. Parmar cites a figure of 17%" [9] or "the fact that only 17% of the work force in technology is female" [3]). The underrepresentation of women in IT and its tendency to worsen with time ("the number of females working in the technology industry may be decreasing by 0.5% every year" [26]) was contrasted with the fast pace of business and societal change driven by IT, with technological developments becoming central to the way people live their lives. Low participation rates result in women forgoing opportunities to pursue lucrative careers and to influence the world of the future:

> Women are missing out in an industry that is changing the world and growing and paying handsomely. [9]

> Less than one in five jobs in technology are held by women. In any industry that would be disappointing. In the industry that's shaping the future of mankind, it's downright criminal. [3]

Some of the coverage conveyed an immediate sense of urgency and struggle. For example, women game developers were reported to participate in the International Women's Day Little Miss Geek ICT School Takeover event because they considered that as women who participate in technology it was their duty to encourage others. This sense of duty was especially strong given that women involved hands-on in computer game development in their own workplace were also a small minority, and those who had broken new ground had a "responsibility to inform and inspire the younger generation" [16].

Some of the coverage interpreted the underrepresentation of women as a skills imbalance, focussing in particular on the skill of computer programming ("coding"). Not only is coding "the language of our future" [27], but also, because women are being "left behind" [6], they need to act and learn this new language despite outside barriers:

> The barrier to learning these skills is often created by the assumption that coding is "not for you", "not creative", "not about communication". [6]

Thus, the coverage of the campaign restated the essentialist assumption that in order to be able to engage in coding, a particular set of attributes is necessary that is not associated with the

female gender. The assumption was rejected ("Don't let anyone tell you that you have been left behind. You have not. You can learn these skills at any life stage." [6]), but the frame thus established suggested that women need to struggle to establish themselves in the IT industry.

The idea that women are not meant to create technology is consistent with a view (repeatedly implicit in the coverage of the campaign) that women are not able to appreciate technology, and to gain their interest in IT they need to be enticed through marketing campaigns with facile attitudes to gender, such as the so-called "pink it and shrink it" [6] mentality approach of tech marketers:

> That brainy-guys-in-the-garage stereotype is hardly helped by companies that ... condescend to female customers with pink devices and offend them with bikini-clad models at technology shows. [9]

Again, the idea was condemned, but repeatedly restating it established a negative frame because the coverage did little to ground its condemnation.

In some instances, the coverage criticised the LMG campaign for not celebrating enough the achievements of women already in IT; however, the argument relied on a brief list of rather remote examples, such as the 18th century mathematician Ada Lovelace or the Yahoo chief executive at the time, Marissa Mayer in the US.

> Some parts of the campaign make me cringe slightly, there's a lack of celebration of the achievements that women have had in technology. [4]

> The promotion and visibility of Marissa Mayer, the recently promoted Yahoo chief executive, and Sheryl Sandberg, the number two at Facebook, comes as the number of women in the industry in the UK at least has been falling over the past 10 years. [2]

4.2 An outdated education system

The LMG campaign coverage overwhelmingly singled out education reform in the UK as an area that needed to be addressed. Events organised by the campaign at two single-sex inner-city London schools acted to focus the attention on the education system. Concern over education's role centred on the poor uptake of computer-related subjects by girls, which was attributed to the IT industry being poorly understood and to IT education delivered in ways that lack reference to IT's creative aspects. In general, the education system was found to be lacking:

> Education systems need to demystify STEM and make it about real-world issues. [41]

> New-look computer-science ... could improve the image problem of ICT, with its PowerPoint presentations and Excel spreadsheets, has had, particularly for girls, for whom the situation is particularly grim. [17]

> A sense that STEM subjects lack creativity ... a huge motivator for girls. [13]

Poor participation in the IT industry was attributed to lack of proper advice by educators, sometimes in a language unwittingly reinforcing a disdainful attitude towards girls and their relationship with IT:

> While girls may enjoy owning the latest devices, parents and teachers do not point out that they also have the brains to build them. [9]

The failure of the education system to facilitate female participation in the IT industry was also linked to vocational advice, as "tech-related jobs are not brought up at careers guidance meetings or higher education events" [36].

Moreover, the road to changing the education sector to enhance IT participation rates was noted to be a rocky one. The Missouri Association for School Administrators in the USA applauded the LMG campaign's sense of purpose and resolve to pursue this issue:

> Perhaps the most admirable trait of the Little Miss Geek movement is its determination …. Determination will be critical in helping to change the education and professional climate. [7]

The emphasis on determination also carries the implication that the change will be hard-fought, thus implying the existence of a strong barrier and suggesting that at present the IT industry is not a good choice for women.

4.3 The pervasiveness of stereotypes

Ample coverage was given to aspects of the LMG campaign that relied on gendered stereotypes to achieve the aim of increasing female participation in IT. For instance, in the Her into Hero event, fashion designers who incorporated emerging wearable technology into their designs were invited to promote IT for girls. In this case the "pink it and shrink it" marketing approach was used to get girls interested in developing and crafting technology, not merely passively consuming it:

> By fusing fashion with technology we were out to demonstrate just how creative technology can be and empower the girls to believe in the endless possibilities of working in tech. [26]

Some scepticism with respect to this approach was also voiced:

> Are the messages and pretty illustrations in danger of reinforcing the stereotypes, rather than dispelling them? [2]

A recurring theme of the campaign coverage was that even though women use technology they do not create it, with numbers sometimes employed to reinforce the point:

> Four out of 10 gadgets are bought by women but only three percent of creative directors in the industry are women. [11]

The campaign coverage also focused on the creators-consumers relationship, pointing out that more women are participating in gaming as users, increasing the likelihood that they would become interested in this field. That women are also part of the industry's customer base was presented as an argument for improving gender balance in the industry:

> The majority of tech products must be developed to appeal to as many people as possible, of either gender …. Men and women must both be in the room. [5]

Negative attitudes from women and girls about IT were attributed to the preconceptions of stakeholders including parents, schools, and the IT industry itself, but also by members of the broader institutional context. This helped to make the point that these stereotypical depictions not only needed to change but were also firmly ingrained. Coverage drew on technical business terminology and used intensifying words such as "seriously" to urge stakeholders to remedy the underrepresentation of women:

> Everyone in the supply chain of technology workers including parents, educators, current industry representatives, marketers, institutions and employers [should] take the gender imbalance seriously. [43]

> Thanks to the preconceptions of parents, teachers, employers and girls themselves, technology isn't often an appealing prospect for girls. [3]

Low participation by women in the IT industry and the trend towards even lower participation were raised repeatedly, along with specific examples illustrating the problem:

> I … advised major companies … and asked one of them to speak to … the women making their products …. To which they responded, "well there's this woman in human resources, or this one who's a personal assistant". That pretty much summed up the problem for me. [41]

The LMG campaign coverage brought to the fore barriers to ameliorating the underrepresentation of women in IT. Not only were women affected by inherent pre-conceptions, but they also faced active discouragement to entering the industry. War imagery, and the suggestion of a tortuous, ongoing process, helped tell the story of what women considering IT careers might come up against:

> [Women] still battle a "constant drip of dissuasion and discouragement" to going into tech. [29]

The imagery of an inhospitable terrain for women ranged from when women are considering entering the IT industry to the point of their exit ("dropout") from the industry. A high attrition rate for women received attention in terms of the IT sector being seen as an inhospitable workplace for women: "a mum wants to go home at 4:30p.m." and "40% more females leave the industry after 10 years compared with their male counterparts" and "there is a higher dropout rate for women" [8].

The coverage suggested a two-fold relationship between the LMG campaign and the IT industry. First, the LMG campaign was presented as an undertaking that sought to address systemic aspects of IT that make it difficult for women to engage in an IT career, and thus as an outsider seeking to change the industry. Second, the coverage focused on links between the LMG campaign and big IT corporations: "supported by Dell and Microsoft" [20]. Dell and Microsoft are not only highly influential in the IT industry (and thus may be seen as responsible for the current underrepresentation of women), but also have been founded by high profile men (Michael Dell and Bill Gates), with stories about the exploits of these charismatic male founders helping to form the current IT industry culture (Meister, 2000; Negroponte, 2003).

A link to a high-profile technology was also indicated: inexpensive Raspberry Pi computers branded as "democratising technology" [14] were suggested as part of a solution for addressing underrepresentation of women: "girls can learn a set of skills on a Raspberry Pi and go and get a job with these exact same skills" [14], although no explanation was provided why Raspberry Pi would benefit girls in particular (and thus help to address gender imbalance). One may argue, that the bare metal aesthetics of Raspberry Pi (Gay, 2014) is likely to be more attractive to boys than to girls (Van Tilburg *et al.*, 2015), and thus might exacerbate the masculinity stereotypes around IT.

Language such as the term "pioneers" (for example, "campaign which aims to inspire women and girls to become pioneers in technology" [41] and "if we want to inspire our young women to be tech pioneers" [42]) conveyed the image of breaking new ground under very difficult, hostile circumstances, going where no one has been before, and once there, changing the landscape. For this pioneering-type action to happen it is necessary to "shatter the myths" [42] (thus, metaphorically, engaging in a violent action):

> We wanted to shatter the myths that technology is a boring "boys" club". Girls see fashion as a creative fun industry. Conversely, they see the tech industry as a dull place. [26]

5. Discussion and conclusion

5.1 Theoretical contribution

Findings indicate that the internet media discourse prompted by the LMG campaign, while on the surface supporting the campaign and its declared goal of promoting women's participation in the IT industry, also framed the role of women in this industry as problematic, thus possibly contributing to the preservation of the current imbalance.

The discourse framed women's participation in the IT industry as difficult to achieve, focused on women's presumed "feminine" essential features (thus, effectively implying that they are less suitable for IT employment than men), and tasked women with overcoming the barrier via individual and sometimes pioneering efforts (thus, implicitly blaming them for the imbalance).

Women's entry into the IT industry was framed as difficult by repeatedly emphasising the magnitude of underrepresentation of women, and women's (and girls') lack of relevant skills. Moreover, by explicitly denouncing the negative stereotypes, the discourse also restated them, painting women as needing a "shrink it and pink it" approach because of their incompatibility with IT and at the same time portraying this industry as dull and lacking in creativity. In addition, by presenting the education system as inadequate, the discourse presented women and girls who are the product of this education system as unprepared and not sufficiently motivated for IT employment. Further, by putting forward high-powered or remote figures as role models, the discourse constructed a large distance between an average woman and IT employment.

By focussing on events involving fashion, the discourse constructed a gendered link between women and the IT industry, suggesting that because women are (essentially) different they need to be presented with a "feminine" aspect of the industry to arouse their interest, thus depicting them as one-dimensional (and therefore, perhaps less suitable for IT employment than men). This was similar to the focus on "feminine" features of women leaders in media discourse around women's leadership weakening their credibility as leaders (Bell and Sinclair, 2016; Elliott and Stead, 2018).

The essentialist bias in the discourse can be traced to the campaign name, "Little Miss Geek", which exemplified the "pink it and shrink it" approach: employing "feminine" attributes that are meant to make the IT industry fit the assumed "feminine" essential characteristics. Although it could be argued that by appropriating "geek" terminology, women and girls are made more powerful, the possibility is trivialised by the "Little Miss" moniker. Further, implicit in the campaign title are the twin messages of women's infantilization and disempowerment. Moreover, the use of the term "geek" conveys the established constructions of the male attributes of IT practitioners.

Finally, the discourse was highly consistent in the subtle (mostly unstated, but clearly implied) emphasis on individual action. It is up to individual women and girls to eliminate the underrepresentation of women by pursuing and maintaining careers in the IT industry, overcoming structural disadvantages and misogynist cultures that they may face. By linking the IT industry to fashion (where the emphasis is on the female body), a mutually reinforcing connection was created to the media discourse that calls on girls to compete as individuals to acquire "perfect" bodies, a discourse criticised in feminist literature as a disguised re-assertion of male dominance (McRobbie, 2015; Kim, 2011). The criticism of the educational system was consistent with the emphasis on individual action, as education improvements were expected to incentivise and to enable action by individuals. In this respect, the discourse can be characterised as neoliberal post-feminist discourse (Gill, 2012; McRobbie, 2009, 2011, 2015): women are empowered as individuals (but not collectively) and are tasked to compete within the patriarchal order that remains. The absence of collective action, as women focus on perfecting themselves to succeed in competing as individuals, safeguards the patriarchal order.

Viewing discourse from Bourdieu's symbolic power perspective, the existing patriarchal order expressed its symbolic power via the categories established in the discourse. Categories about women included: being left behind; lacking IT skills; unable to appreciate technology beyond their role as users; the failure of the education system in preparing them for IT careers; receiving poor advice; preferring fashion to technology; not having "brains"; and, requiring individual effort in an environment that does not fit their gender. These categories framed the IT industry as highly unattractive for women, indeed constituting "a solemn act of categorisation [that] tends to produce what it designates" (Bourdieu and Thompson, 1991, p. 212). The emphasis on issues that make joining the IT industry difficult for women was bound to make it less likely that they would even try to join. Negating the existence of issues (or calling individuals to face the issues) does not undo the negative framing once the issues have been prominently mentioned.

As we expose negative framing in the discourse around the LMG campaign, a question naturally arises: how could a discourse around women's participation in the IT industry avoid subtle biases that end up preserving the existing underrepresentation of women in the industry? The study by Bell and Sinclair (2016) may provide an answer in its analysis of the Danish television drama series Borgne. The series presents women leaders as relatable, embodied and agentic, and negotiating their professional growth amid everyday concerns. Bell and Sinclair (2016) conclude that the series "equips viewers with multiple and dynamic ways of participating in women's experiences of leadership" (p. 334). A further example could be the text of the article by Birbaumer *et al.* (2007) that presents life histories of women with IT careers: here everyday women and girls live their lives while working in the IT industry. Both of these examples depict career choices for women and girls without framing the careers as unreachably difficult and are free from essentialist biases around "femininity". Moreover, women are depicted as getting support from their families and as living their lives rather than competing to achieve individual goals.

The issue of how women's participation in the IT industry is framed in the media retains its relevance. For example, an advert featuring a ballet dancer tying her shoes, captioned "Fatima's next job could be in tech" has been scrapped from a UK government-backed campaign aiming to encourage people working in the arts to turn to a career in cybersecurity (Bakare, 2020). The reason given for withdrawing the advert was that it was considered to be in bad taste considering that many workers in the arts were losing jobs due to the COVID pandemic. We argue that the advert also exemplified the "pink it and shrink it" approach, framing arts as a natural fit for a woman's career (in contrast with a career in security), thus carrying a hidden message that was at odds with the ad's intent. Another example is a media article (Romei, 2020) that seeks to defend women's interests by highlighting that the rapid growth of the IT industry since the start of the COVID pandemic has resulted in more jobs for men, and thus, in greater gender inequality. This article is an example of the continued framing of the IT industry as a natural employer of men. A UK organisation "passionate about introducing girls to rewarding careers in technology" (https://girlscodetoo.co.uk/#about) is a case in point of negative framing in the chosen name, "Girls Code Too". The implication is that coding is a natural activity for boys while girls are secondary in this context, and that for girls coding is not a natural fit.

5.2 Practical implications

Our analysis suggests that organisers of campaigns to promote the participation of women in the IT industry should be aware of the internet media responses generated by their campaigns (which have a global reach) and should attempt to guide the discourse to be in support of the broader goal of gender equality in the IT industry. The implications for practice are best expressed in terms of Bourdieu's "reflexivity" (Bourdieu, 2000): the organisers should reflect on prevailing social conditions framing discourses around women's participation in the IT industry and should refrain from supporting frames that stem from categories suggested by the symbolic power of the existing patriarchal order. Rather, they should attempt to guide the discourse towards the establishment of new frames, frames that promote women's participation in the IT industry.

At the same time, as "reflexivity is incumbent on all those who are engaged" (Bourdieu, 2000, p. 119), an effort broader than sporadic campaigns is needed to establish discourse categories and frames that support women's participation in the IT industry strongly enough to make a difference. Campaigns and organisations that promote women's participation (and ultimately, the IT industry itself) should work to establish such frames though their on-going discursive practice. Such effort may rely on the experience in the medical field, where social media has been used with success to promote discourses encouraging healthy behaviours, such as vaccination (Bonnevie *et al.*, 2020, 2021; Bozzola *et al.*, 2021; de Matos *et al.*, 2020; Subekti, 2021; Murthy *et al.*, 2021).

5.3 Future research

In further research, the present study may be complemented by a study of discourses of women and girls in the IT industry using Bourdieu's habitus (Lizardo, 2004; McNay, 1999; Bourdieu, 2000) as a theoretical lens, following the approach used by Kvasny (2005) to study digital divide. The concept of habitus incorporates both individual experiences and societal influences, and thus, by bridging individual-level and social-structural aspects (Miner *et al.*, 2018), may offer a rich understanding of how individual experiences, societal influences, and relevant forms of capital that women and girls may possess or perceive to possess, such as cultural, social, navigational, technical, and economic capital (Joshi *et al.*, 2016; Bourdieu, 1990) accumulate and interact to form social positions of women with respect to IT employment.

References

Ahuja, M.K. (2002), "Women in the information technology profession: a literature review, synthesis and research agenda", *European Journal of Information Systems*, Vol. 11 No. 1, pp. 20-34, doi: 10.1057/palgrave.ejis.3000417.

Alfrey, L. and Twine, F.W. (2017), "Gender-fluid geek girls: negotiating inequality regimes in the tech industry", *Gender and Society*, Vol. 31 No. 1, pp. 28-50, doi: 10.1177/0891243216680590.

Alvesson, M. and Karreman, D. (2000), "Varieties of discourse: on the study of organizations through discourse analysis", *Human Relations*, Vol. 53 No. 9, pp. 1125-1149, doi: 10.1177/0018726700539002.

Armstrong, D.J., Riemenschneider, C.K., Allen, M.W. and Reid, M.F. (2007), "Advancement, voluntary turnover and women in IT: a cognitive study of work–family conflict", *Information and Management*, Vol. 44 No. 2, pp. 142-153, doi: 10.1016/j.im.2006.11.005.

Bakare, L. (2020), "Government Scraps Ballet Dancer Reskilling Ad Criticised as 'crass'", *Guardian*, available at: https://www.theguardian.com/politics/2020/oct/12/ballet-dancer-could-reskill-with-job-in-cyber-security-suggests-uk-government-ad

Bell, E. and Sinclair, A. (2016), "Bodies, sexualities and women leaders in popular culture: from spectacle to metapicture", *Gender in Management*, Vol. 31 Nos 5-6, pp. 322-338, doi: 10.1108/gm-10-2014-0096.

Bennett, A. and Seyis, D. (2021), "The online market's invisible hand: internet media and rising populism", *Political Studies*, doi: 10.1177/00323217211033230.

Birbaumer, A., Lebano, A., Ponzellini, A., Tolar, M. and Wagner, I. (2007), "From the margins to a field of opportunities: life story patterns of women in ICT", *Women's Studies International Forum*, Vol. 30 No. 6, pp. 486-498, doi: 10.1016/j.wsif.2007.09.001.

Bonnevie, E., Rosenberg, S.D., Kummeth, C., Goldbarg, J., Wartella, E. and Smyser, J. (2020), "Using social media influencers to increase knowledge and positive attitudes toward the flu vaccine", *Plos One*, Vol. 15 No. 10, p. e0240828, doi: 10.1371/journal.pone.0240828.

Bonnevie, E., Smith, S.M., Kummeth, C., Goldbarg, J. and Smyser, J. (2021), "Social media influencers can be used to deliver positive information about the flu vaccine: findings from a multi-year study", *Health Education Research*, Vol. 36 No. 3, pp. 286-294, doi: 10.1093/her/cyab018.

Bourdieu, P. (1990), *The Logic of Practice*, Stanford University Press, Stanford, CA.

Bourdieu, P. (2000), *Pascalian Meditations*, Polity Press, Stanford, CA.

Bourdieu, P. (2001), *Masculine Domination*, Stanford University Press, Stanford, CA.

Bourdieu, P. and Thompson, J.B. (1991), *Language and Symbolic Power*, Polity in Association with Basil Blackwell, Cambridge, MA.

Bozzola, E., Staiano, A.M., Spina, G., Zamperini, N., Marino, F., Roversi, M. and Corsello, G. (2021), "Social media use to improve communication on children and adolescent's health: the role of the Italian Paediatric Society influencers", *Italian Journal of Pediatrics*, Vol. 47 No. 1, pp. 1-9, doi: 10.1186/s13052-021-01111-7.

Braun, V. and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology*, Vol. 3 No. 2, pp. 77-101, doi: 10.1191/1478088706qp063oa.

Burr, V. (2003), *Social Constructionism*, Routledge, London.

Ceci, S.J. and Williams, W.M. (2010), "Sex differences in math-intensive fields", *Current Directions in Psychological Science*, Vol. 19 No. 5, pp. 275-279, doi: 10.1177/0963721410383241.

Charlesworth, T.E. and Banaji, M.R. (2019), "Gender in science, technology, engineering, and mathematics: issues, causes, solutions", *Journal of Neuroscience*, Vol. 39 No. 37, pp. 7228-7243, doi: 10.1523/jneurosci.0475-18.2019.

Craig, A. (2016), "Theorising about gender and computing interventions through an evaluation framework", *Information Systems Journal*, Vol. 26 No. 6, pp. 585-611, doi: 10.1111/isj.12072.

Crump, B., Logan, K. and Mcilroy, A. (2007), "Does gender still matter? A study of the views of women in the ICT industry in New Zealand", *Gender, Work and Organization*, Vol. 14 No. 4, pp. 349-370, doi: 10.1111/j.1468-0432.2007.00348.x.

Daine, K., Hawton, K., Singaravelu, V., Stewart, A., Simkin, S. and Montgomery, P. (2013), "The power of the web: a systematic review of studies of the influence of the internet on self-harm and suicide in young people", *PloS One*, Vol. 8 No. 10, e77555, doi: 10.1371/journal.pone.0077555.

De Matos, N., Correia, M.B., Saura, J.R., Reyes-Menendez, A. and Baptista, N. (2020), "Marketing in the public sector—benefits and barriers: a bibliometric study from 1931 to 2020", *Social Sciences*, Vol. 9 No. 10, p. 168, doi: 10.3390/socsci9100168.

Demaiter, E.I. and Adams, T.L. (2009), "'I really didn't have any problems with the male-female thing until . . .': successful women's experiences in IT organizations", *Canadian Journal of Sociology*, Vol. 34 No. 1, pp. 31-53, doi: 10.29173/cjs1126.

Derks, B., Van Laar, C. and Ellemers, N. (2016), "The queen bee phenomenon: why women leaders distance themselves from junior women", *The Leadership Quarterly*, Vol. 27 No. 3, pp. 456-469, doi: 10.1016/j.leaqua.2015.12.007.

Dettling, L.J. (2017), "Broadband in the labor market: the impact of residential high-speed internet on married women's labor force participation", *Ilr Review*, Vol. 70 No. 2, pp. 451-482, doi: 10.1177/0019793916644721.

Elliott, C. and Stead, V. (2018), "Constructing women's leadership representation in the UK press during a time of financial crisis: gender capitals and dialectical tensions", *Organization Studies*, Vol. 39 No. 1, pp. 19-45, doi: 10.1177/0170840617708002.

Entman, R.M. (1993), "Framing: toward clarification of a fractured paradigm", *Journal of Communication*, Vol. 43 No. 4, pp. 51-58, doi: 10.1111/j.1460-2466.1993.tb01304.x.

Fountain, J.E. (2000), "Constructing the information society: women, information technology, and design", *Technology in Society*, Vol. 22 No. 1, pp. 45-62, doi: 10.1016/s0160-791x(99)00036-6.

Gay, W.W. (2014), *Mastering the Raspberry Pi*, Apress.

Gill, R. (2012), "Media, empowerment and the 'sexualization of culture' debates", *Sex Roles*, Vol. 66 Nos 11-12, pp. 736-745, doi: 10.1007/s11199-011-0107-1.

Gorbacheva, E., Beekhuyzen, J., Vom Brocke, J. and Becker, J. (2018), "Directions for research on gender imbalance in the IT profession", *European Journal of Information Systems*, Vol. 28 No. 1, pp. 43-67, doi: 10.1080/0960085x.2018.1495893.

Grant, D., Hardy, C., Oswick, C. and Putnam, L. (2004), *The SAGE Handbook of Organizational Discourse*, SAGE, London.

Gray, K.L., Buyukozturk, B. and Hill, Z.G. (2017), "Blurring the boundaries: using Gamergate to examine "real" and symbolic violence against women in contemporary gaming culture", *Sociology Compass*, Vol. 11, e12458, doi: 10.1111/soc4.12458.

Grenfell, M. (2014), *Pierre Bourdieu: Key Concepts*, Routledge.

Guerrier, Y., Evans, C., Glover, J. and Wilson, C. (2009), "'Technical, but not very. . ..': constructing gendered identities in IT-related employment", *Work, Employment and Society*, Vol. 23 No. 3, pp. 494-511, doi: 10.1177/0950017009337072.

Heizmann, H. and Liu, H. (2018), "Becoming green, becoming leaders: identity narratives in sustainability leadership development", *Management Learning*, Vol. 49 No. 1, pp. 40-58, doi: 10.1177/1350507617725189.

Henttonen, E., Lapointe, K., Pesonen, S. and Vanhala, S. (2013), "A Stain on the white uniform—the discursive construction of nurses' industrial action in the media", *Gender, Work and Organization*, Vol. 20 No. 1, pp. 56-70, doi: 10.1111/j.1468-0432.2011.00556.x.

Hicks, M. (2017), *Programmed Inequality: How Britain Discarded Women Technologists and Lost its Edge in Computing*, MIT Press, Cambridge, MA.

Honeypot (2018), "2018 women in tech index", available at: https://honeypotio.github.io/women-in-tech

Howcroft, D. and Trauth, E. (2008), "The implications of a critical agenda in gender and IS research", *Information Systems Journal*, Vol. 18 No. 2, pp. 185-202, doi: 10.1111/j.1365-2575.2008.00294.x.

Igbaria, M. and Baroudi, J.J. (1995), "The impact of job performance evaluations on career advancement prospects: an examination of gender differences in the IS workplace", *MIS Quarterly*, Vol. 19 No. 1, pp. 107-123, doi: 10.2307/249713.

Ignatow, G. and Robinson, L. (2017), "Pierre Bourdieu: theorizing the digital", *Information, Communication and Society*, Vol. 20 No. 7, pp. 950-966, doi: 10.1080/1369118x.2017.1301519.

Joshi, K., Kvasny, L., Unnikrishnan, P. and Trauth, E. (2016), "How do black men succeed in IT careers? The effects of capital", *49th Hawaii International Conference on System Sciences (HICSS)*, Koloa, HI, January 5-8, IEEE, pp. 4729-4738.

Kim, Y. (2011), "Idol republic: the global emergence of girl industries and the commercialization of girl bodies", *Journal of Gender Studies*, Vol. 20 No. 4, pp. 333-345, doi: 10.1080/09589236.2011.617604.

Kramsch, C. (2016), "The multiple faces of symbolic power", *Applied Linguistics Review*, Vol. 7 No. 4, pp. 517-529, doi: 10.1515/applirev-2016-0023.

Kvasny, L. (2005), "The role of the habitus in shaping discourses about the digital divide", *Journal of Computer-Mediated Communication*, Vol. 10 No. 2, doi: 10.1111/j.1083-6101.2005.tb00242.x.

Kvasny, L., Trauth, E. and Morgan, A.J. (2009), "Power relations in IT education and work: the intersectionality of gender, race, and class", *Journal of Information, Communication and Ethics in Society*, Vol. 7 Nos 2/3, pp. 96-118, doi: 10.1108/14779960910955828.

Lang, R. and Rybnikova, I. (2016), "Discursive constructions of women managers in German mass media in the gender quota debate 2011-2013", *Gender in Management*, Vol. 31 Nos 5/6, pp. 359-373, doi: 10.1108/gm-02-2016-0017.

Langer, N., Gopal, R.D. and Bapna, R. (2020), "Onward and upward? An empirical investigation of gender and promotions in Information Technology Services", *Information Systems Research*, Vol. 31 No. 2, pp. 383-398, doi: 10.1287/isre.2019.0892.

Levina, N. and Arriaga, M. (2014), "Distinction and status production on user-generated content platforms: using Bourdieu's theory of cultural production to understand social dynamics in online fields", *Information Systems Research*, Vol. 25 No. 3, pp. 468-488, doi: 10.1287/isre.2014.0535.

Lin, Y.W. and Den Besten, M. (2019), "Gendered work culture in free/libre open source software development", *Gender, Work and Organization*, Vol. 26 No. 7, pp. 1017-1031, doi: 10.1111/gwao.12255.

Liu, H. (2017), "The masculinisation of ethical leadership dis/embodiment", *Journal of Business Ethics*, Vol. 144 No. 2, pp. 263-278, doi: 10.1007/s10551-015-2831-x.

Liu, P., Cao, J., Nie, W., Wang, X., Tian, Y. and Ma, C. (2021), "The influence of internet usage frequency on women's fertility intentions—the mediating effects of gender role attitudes", *International Journal of Environmental Research and Public Health*, Vol. 18 No. 9, p. 4784, doi: 10.3390/ijerph18094784.

Lizardo, O. (2004), "The cognitive origins of Bourdieu's habitus", *Journal for the Theory of Social Behaviour*, Vol. 34 No. 4, pp. 375-401, doi: 10.1111/j.1468-5914.2004.00255.x.

Lumsden, K. and Morgan, H. (2017), "Media framing of trolling and online abuse: silencing strategies, symbolic violence, and victim blaming", *Feminist Media Studies*, Vol. 17 No. 6, pp. 926-940, doi: 10.1080/14680777.2017.1316755.

Mavin, S.A., Elliott, C., Stead, V. and Williams, J. (2016), "Women managers, leaders and the media gaze: learning from popular culture, autobiographies, broadcast and media press", *Gender in Management*, Vol. 31 Nos 5-6, pp. 314-321, doi: 10.1108/gm-05-2016-0105.

Mccall, L. (1992), "Does gender fit? Bourdieu, feminism, and conceptions of social order", *Theory and Society*, Vol. 21 No. 6, pp. 837-867, doi: 10.1007/bf00992814.

Mcnay, L. (1999), "Gender, habitus and the field: pierre Bourdieu and the limits of reflexivity", *Theory, Culture and Society*, Vol. 16 No. 1, pp. 95-117, doi: 10.1177/026327699016001007.

Mcrobbie, A. (2009), *The Aftermath of Feminism: Gender, Culture and Social Change*, SAGE, London.

Mcrobbie, A. (2011), "Beyond post-feminism", *Public Policy Research*, Vol. 18 No. 3, pp. 179-184, doi: 10.1111/j.1744-540x.2011.00661.x.

Mcrobbie, A. (2015), "Notes on the perfect: competitive femininity in neoliberal times", *Australian Feminist Studies*, Vol. 30 No. 83, pp. 3-20, doi: 10.1080/08164649.2015.1011485.

Meister, J.C. (2000), "The CEO-driven learning culture", *Training and Development*, Vol. 54 No. 6, p. 52.

Miner, K.N., Walker, J.M., Bergman, M.E., Jean, V.A., Carter-Sowell, A., January, S.C. and Kaunas, C. (2018), "From 'her' problem to 'our' problem: using an individual lens versus a social-structural lens to understand gender inequity in STEM", *Industrial and Organizational Psychology*, Vol. 11 No. 2, pp. 267-290, doi: 10.1017/iop.2018.7.

Moody, J.W., Beise, C.M., Woszczynski, A.B. and Myers, M. (2003), "Diversity and the information technology workforce: barriers and opportunities", *Journal of Computer Information Systems*, Vol. 43 No. 4, pp. 63-71, doi: 10.1145/761849.761869.

Murthy, B.P., Leblanc, T.T., Vagi, S.J. and Avchen, R.N. (2021), "Going viral: the 3 Rs of social media messaging during public health emergencies", *Health Security*, Vol. 19 No. 1, pp. 75-81, doi: 10.1089/hs.2020.0157.

Naidoo, R., Coleman, K. and Guyo, C. (2019), "Exploring gender discursive struggles about social inclusion in an online gaming community", *Information Technology and People*, Vol. 33 No. 2, pp. 576-601, doi: 10.1108/itp-04-2019-0163.

Negroponte, N. (2003), "Creating a culture of ideas", *Technology Review*, Vol. 106 No. 1, pp. 34-35.

Office for National Statistics (2021), "Annual population survey - employment by occupation by sex", available at: https://www.nomisweb.co.uk/datasets/aps168/reports/employment-by-occupation?compare=K02000001

Ozkazanc-Pan, B. and Clark Muntean, S. (2018), "Networking towards (in) equality: women entrepreneurs in technology", *Gender, Work and Organization*, Vol. 25 No. 4, pp. 379-400, doi: 10.1111/gwao.12225.

Parmar, B. (2012), *Little Miss Geek: Bridging the Gap between Girls and Technology*, Lady Geek.

Pratt, M.G., Kaplan, S. and Whittington, R. (2020), "Editorial essay: the tumult over transparency: decoupling transparency from replication in establishing trustworthy qualitative research", *Administrative Science Quarterly*, Vol. 65 No. 1, pp. 1-19, doi: 10.1177/0001839219887663.

Ridley, G. and Young, J. (2012), "Theoretical approaches to gender and IT: examining some Australian evidence", *Information Systems Journal*, Vol. 22 No. 5, pp. 355-373, doi: 10.1111/j.1365-2575.2012.00413.x.

Riemenschneider, C.K., Armstrong, D.J., Allen, M.W. and Reid, M.F. (2006), "Barriers facing women in the IT work force", *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, Vol. 37 No. 4, pp. 58-78, doi: 10.1145/1185335.1185345.

Ring, K. (2018), "Women in Tech: India leads the way", *451 Research*, available at: https://go.451research.com/women-in-tech-india-employment-trends.html

Romei, V. (2020), "Pandemic boost to tech and digital industries worsens gender job divide", *Financial Times*, available at: https://www.ft.com/content/21ae50e1-56e6-43d4-acc2-d6fc45dba447

Shoib, G., Nandhakumar, J. and Richardson, H. (2009), "Taking a feminist approach to information systems research and using the "thinking tools" provided by the sociologist Pierre Bourdieu", *Information Technology and People*, Vol. 22 No. 1, pp. 26-35, doi: 10.1108/09593840910937472.

Sia, S.K., Tang, M., Soh, C. and Boh, W.F. (2002), "Enterprise resource planning (ERP) systems as a technology of power: empowerment or panoptic control?", *ACM SIGMIS Database*, Vol. 33 No. 1, pp. 23-37, doi: 10.1145/504350.504356.

Soe, L. and Yakura, E.K. (2008), "What's wrong with the pipeline? Assumptions about gender and culture in IT work", *Women's Studies*, Vol. 37 No. 3, pp. 176-201, doi: 10.1080/00497870801917028.

Subekti, D. (2021), "Using social media as tools of health protocol campaign in the era of the Covid-19 pandemic in Indonesia", *International Journal of Media and Communication Research*, Vol. 2 No. 2, pp. 12-23, doi: 10.25299/ijmcr.v2i2.6230.

Trauth, E. (2013), "The role of theory in gender and information systems research", *Information and Organization*, Vol. 23 No. 4, pp. 277-293, doi: 10.1016/j.infoandorg.2013.08.003.

Trauth, E. and Howcroft, D. (2006), "Critical empirical research in IS: an example of gender and the IT workforce", *Information Technology and People*, Vol. 19 No. 3, pp. 272-292, doi: 10.1108/09593840610689859.

Trauth, E., Quesenberry, J.L. and Huang, H. (2009), "Retaining women in the US IT workforce: theorizing the influence of organizational factors", *European Journal of Information Systems*, Vol. 18 No. 5, pp. 476-497, doi: 10.1057/ejis.2009.31.

Truman, G.E. and Baroudi, J.J. (1994), "Gender differences in the information systems managerial ranks: an assessment of potential discriminatory practices", *MIS Quarterly*, Vol. 18 No. 2, pp. 129-142, doi: 10.2307/249761.

Udasmoro, W. (2013), "Symbolic violence in everyday narrations: gender construction in Indonesian television", *Asian Journal of Social Sciences and Humanities*, Vol. 2 No. 3, pp. 155-165.

Vaara, E. and Tienari, J. (2002), "Justification, legitimization and naturalization of mergers and acquisitions: a critical discourse analysis of media texts", *Organization*, Vol. 9 No. 2, pp. 275-304, doi: 10.1177/1350508402009002912.

Valk, R. and Srinivasan, V. (2011), "Work–family balance of Indian women software professionals: a qualitative study", *IIMB Management Review*, Vol. 23 No. 1, pp. 39-50, doi: 10.1016/j.iimb.2010.10.010.

Van Tilburg, M., Lieven, T., Herrmann, A. and Townsend, C. (2015), "Beyond 'pink it and shrink it' perceived product gender, aesthetics, and product evaluation", *Psychology and Marketing*, Vol. 32 No. 4, pp. 422-437, doi: 10.1002/mar.20789.

Vehvilainen, M. (1999), "Gender and computing in retrospect: the case of Finland", *IEEE Annals of the History of Computing*, Vol. 21 No. 2, pp. 44-51, doi: 10.1109/85.761794.

Wijayawardena, K., Wijewardena, N. and Samaratunge, R. (2017), "Compromising gender identities: stay strategies of women in gender-atypical information technology firms in Sri Lanka", *Information Technology and People*, Vol. 30 No. 2, pp. 246-264, doi: 10.1108/ITP-01-2016-0012.

Willig, C. (1999), "Discourse analysis and sex education", in WILLIG, C. (Ed.), *Applied Discourse Analysis: Social and Psychological Interventions*, Open University Press, pp. 110-124.

Xenos, M. and Moy, P. (2007), "Direct and differential effects of the Internet on political and civic engagement", *Journal of Communication*, Vol. 57 No. 4, pp. 704-718, doi: 10.1111/j.1460-2466.2007.00364.x.

Appendix

The Little Miss Geek campaign

The campaign involved three events held in London inner-city schools: Little Miss Geek ICT School Takeover, Wearable Technology, and Her into Hero. All three events were launched at schools on dates of significance for women: International Women's Day, International Girls in ICT Day, and Ada Lovelace Day (named after a 19th century woman who is credited with being the first to formally specify an algorithm intended for execution by a machine, and thus often described as the world's first computer programmer). They also followed a pattern of involving the participation of prominent personalities such as politicians, high-profile fashion designers, and high-flying IT industry professionals. The LMG campaign included giving schoolgirls software development experience, as well as presenting them with insights into the world of IT innovation by showcasing wearable technology and Internet of things (IoT). The final event (Her into Hero) focussed on prominent women in IT, with the aim of celebrating women successful in technology.

Corresponding author
Tanya Jurado can be contacted at: t.r.jurado@massey.ac.nz