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**The Technofuture is Female?: Women in Information
Technology in the Czech Republic**

by
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Abstract

While gender is rarely considered a variable behind the digital divide in the developed world, previous studies from scholars such as Walterová and Zalisová and institutions such as the United Nations Development Programme have shown that in the Czech Republic, the widest digital divide has historically been between men and women. Although the digital divide along gender lines has narrowed substantially in recent years in terms of access to ICTs, it persists with respect to both skill level and participation in the information technology workforce. This paper explores the ways cultural norms, the transition to capitalism, and information policy in the Czech Republic have shaped the digital divide in the country and the impact these factors have had on women's education and employment in information technology, as well as their usage of ICTs more broadly. This paper draws from both the existing literature and original interviews with Czech women to examine how these factors have come together to discourage women from pursuing an interest in information technology. The findings demonstrate that while cultural expectations of women, the rigid structure of the Czech education system, and the gender wage gap prevent many women from acquiring the higher skills needed to qualify for a job in the information technology sector, several organizations throughout the country are actively working to increase the presence of women in information technology with positive results.

Keywords

cyberfeminism, Czech Republic, digital divide, information technology, post-communism

In his 2012 article "The Evolution of the Digital Divide", van Dijk defines the digital divide as measurable "inequalities in four successive types of access: motivation, physical access, digital skills, and different usage" (van Dijk 2012). This and other definitions of the digital divide overwhelmingly focus on the differences between users and non-users, or skilled users and less skilled users, of information and communication technologies (ICTs). The differences between creators and non-creators of software, programs, and content, meanwhile, largely do not factor into discussions about the digital divide and are instead relegated to discussions concerning the homogeneity of those who create and work in information technology

fields. In a world that is more connected than ever before and where ICTs are increasingly accessible and affordable, it may be worth expanding van Dijk's and other definitions of the digital divide to acknowledge the fact that women, people of color, people living in underdeveloped and developing regions, and people of a lower socioeconomic status are less likely to work in information technology fields and have access to educational and other opportunities that will enable them to do so. The need to make such opportunities available to a wider range of people has made itself particularly clear as artificial intelligence (AI) naturally reflects and perpetuates the biases and prejudices of the humans who create AI (Risse 2019). Without an expansion of opportunities to work in information technology to those who are not part of the dominant echelons of society, we can expect to see the biases of creators continue to go unchecked, an outcome that carries serious implications as AI further pervades the fabric of human life and helps decide the life outcomes of those who are already marginalized (O'Neil 2016).

With the changing shape of the digital divide in mind, we can revise the "physical access" aspect of van Dijk's definition to another phrase such as "opportunity access" or "educational access". This paper thus focuses on the aspect of access in an evolved understanding of the digital divide, focusing on women in information technology in the contemporary Czech Republic as a case study. Through looking at the interactions between the gender digital divide of the previous decade, ICT policy, and the involvement of women in the information technology workforce today, this paper seeks to develop an understanding of the factors preventing women in the Czech Republic from gaining education and employment in information technology fields given their high numbers of involvement in these fields prior to the

end of the communist regime in 1989, as well as their limited reasons for using ICTs in their personal lives. I employ a theoretical framework informed by both cyberfeminist theory and social movement theory, as well as van Dijk's theory of digital technology access and societal impacts (van Dijk 1999). This framework serves as a lens through which the intersection between gender and the digital divide can be more thoroughly analyzed, as well as the basis for the research questions described below.

As a post-communist nation that has been eager to model itself on the capitalist nations of the West rather than its fellow formerly communist neighbors to the East in terms of both culture and political economy, the Czech Republic presents an interesting case in terms of the digital divide along gendered lines regardless of which definition is employed. For instance, van Dijk's definition can be used to describe the digital divide between women and men in the first decade or so of the twenty-first century, as the literature concerning that period suggests that women in the Czech Republic not only had less access to ICTs than men did, but also had a less refined skill set and were more likely to consume information than produce it (Walterová and Zalisová 2011). Today, access to ICTs between genders in the Czech Republic is nearly equal; however, women continue to be less involved in the information technology workforce and tend to restrict their usage of ICTs to social interaction with friends and family members rather than content creation (Rambousek, et. al. 2012). This is partially due to traditional expectations of women in Czech society and the impenetrable nature of many fields, including information technology, after a certain point in a woman's life. In addition to the lack of women's involvement in the information technology sector and the absence of skills and information literacy training geared towards women, existing research on the topic also implies that the gender digital divide persists

due to changes in Czech society that have accompanied the post-communist transition to capitalism. These changes include lower rates of women participating in the workforce overall, less access to higher education, and the disappearance of large numbers of women from more technical fields — as of 2018, women make up only about 11 percent of the Czech information technology workforce (Argent 2008; Honeypot 2018). As a result, women have fewer opportunities to find themselves in workplaces and classrooms that might facilitate not only access to ICTs, but also the opportunity to develop technology skills and design their own programs and content.

Literature concerning the digital divide in the world as a whole rarely considers gender as a factor behind this phenomenon, even though in the Czech Republic and other former Eastern Bloc countries, the digital divide has historically been the widest along gender lines and remained stagnant throughout the beginning of the twenty-first century even as it narrowed along other lines, such as age, socioeconomic status, and education level (Walterová and Zalisová 2011). This void in the literature is complemented by the absence of gender as a point of consideration in ICT policy. Adomi (2010) offers a rather broad definition of ICT policy, describing it as any set of guidelines for the implementation of ICTs in a given country that often address both access to these technologies and their cost; such policy can cover technologies ranging from radios to computers and televisions. Through ICT policy, states ensure that infrastructure is widespread enough to support access for a large number of different groups and in a variety of geographic areas within their respective country (Adomi 2010). Much like van Dijk's definition of the digital divide, this definition of ICT policy omits any mention of state efforts to make the information technology sector more reflective and representative of

populations; however, this is not surprising given that there are still few, if any, governments making an effort to promote the inclusion of marginalized groups in their information technology workforces. As a result, for the purposes of this paper, I focus on ICT policy as it relates to access to and usage of computers and the internet as these are the technologies most commonly associated with the digital divide. These are also the technologies to which women in the Czech Republic have the most access, irrespective of their individual skill levels or what they choose to do with that access (World Wide Web Foundation 2015).

This paper primarily examines the contemporary gender digital divide in the Czech Republic and the ways in which women navigate it in order to gain the skills needed to create their own programs and content, drawing from previous research conducted on the country's digital divide and its policies pertaining to ICTs. As discussed above, Adomi offers a rather broad definition of ICT policy, noting that it can address technologies ranging from older tools such as televisions and radios to tools like computers and mobile phones which have been developed for popular consumption more recently. For the purposes of this paper, I focus my analysis of ICT policy in the Czech Republic on computer and internet access as measurements of access and usage to these specific technologies represent the quantitative data that traditionally defines digital divides.

In my examination of the factors influencing the gender digital divide that, within the Global North, appear to be unique to the Czech Republic and other former Eastern Bloc countries, I suggest that the structural and societal changes associated with post-communism are at least partially behind the existence of such a divide. Post-communism is generally understood as the period of political and economic transition to free market capitalism in formerly

communist countries in Europe and Asia. In the Czech Republic, this transition is associated with a decline in the proportion of women in the workforce, as well as a larger gender wage gap, resulting in smaller salaries that make it difficult for women — particularly single women — to afford computers and internet access at home (Argent 2008). Post-communism in the Czech Republic is also associated with disparities in the types of jobs that women and men pursue, with today's women being less likely than their communist era counterparts to study information technology at the university level and later hold positions that call for an expertise in such areas as designing programs and software or creating original content (Galpin 2002; HoneyPot 2018).

This paper continues with a review of relevant literature concerning the roles that women have historically played in different periods in Czech society, looking specifically at the Czech National Revival during the eighteenth and nineteenth centuries and the communist regime that governed independent Czechoslovakia during much of the twentieth century. These historical roles provide a backdrop for the contemporary status of women in Czech society and the perspectives that Czech women maintain with regards to women's organizations and feminist movements. This discussion is followed by an overview of ICT policy in the Czech Republic, with special attention paid to the place of gender in ICT policy and funding and support (or lack thereof) provided by nongovernmental organizations towards the goal of remedying the country's gender digital divide. The literature review culminates with an overview of cyberfeminist theory more broadly and an analysis of contemporary cyberfeminism in the Czech Republic more specifically, with particular attention given to current efforts to increase the presence of women in the country's information technology sector.

In the following section, I discuss the methodology used to conduct original qualitative research concerning the impact of societal norms and expectations of women, ICT policy, and the gender digital divide on women's participation in the information technology workforce and their usage of ICTs. I describe the three groups of relevant individuals I interviewed — academic faculty from the fields of information science, sociology, and women's studies; librarians and other information professionals; and women involved with organizations that seek to introduce women to the information technology workforce — and the topics that each set of interviews discussed. Qualitative interviews were conducted with a total of six women involved in information technology fields in the Czech Republic. Finally, I provide a timeline for when the interviews were planned and conducted, as well as when the literature review was performed and quantitative data was lifted from the existing literature. Combined with the literature review, the interviews aimed to answer several questions that I identified as critical to developing an understanding of the current state of the gender digital divide in the Czech Republic.

The paper concludes with a description of the results gleaned from interviews and the ways that these results answer the above research questions, as well as suggestions for areas of further research. As will be further described in the following section, the literature on this topic thus far suggests that a lingering side effect of the previous decade's gender digital divide is that, even when women do have physical access to ICTs, they use ICTs differently than men do and with less frequency. The literature also hints at a link between the transition to capitalism and the numbers of women studying and working in information technology fields since 1989, attributing the latter shift to changed attitudes towards the place of women in Czech society at both the societal and governmental levels (Argent 2008; Galpin 2002; Honeypot 2018).

Responses provided during interviews indicate that these differences and attitudes persist at the time of writing, but are also beginning to improve due to the efforts of individual women and various organizations operating within the Czech Republic.

Literature review

Women during the Czech National Revival

The importance of women in the Czech political sphere and Czech society more generally has been recognized since the middle of the eighteenth century, when the Czech National Revival first arose in response to centuries of outside rule over the territory that today makes up the Czech Republic. The goal of the Czech National Revival was to spark renewed interest in Czech culture, language, and national identity as the Czech lands were becoming increasingly Germanized under the Habsburg and Austro-Hungarian empires (Pynsent 2003). Within this movement, women were viewed as instrumental to the formation of Czech national identity. Women's groups organized and met to discuss issues that were relevant to them within the context of the Czech national movement, and schools were founded to provide female students with an education beyond the elementary level (Francíková 2017). Despite the seemingly elevated status of women during the Czech National Revival, a deeper examination finds that women were still not seen as equal to men, and that efforts to organize and educate women grew from the belief that women were responsible for birthing and raising good Czech citizens who spoke the Czech language and celebrated its culture. The women's schools that were established as part of the Czech National Revival primarily focused on home economics education rather than the more intellectual topics that male students were allowed to pursue, and

women who were seen as leaders within the movement typically minimized their involvement after marriage due to the belief that one could not simultaneously be an effective leader and take care of one's home and family. Relatedly, after the Czech lands gained independence in 1918 and subsequently formed part of Czechoslovakia, women's citizenship was tied to that of their fathers and, after marriage, their husbands (Francíková 2017). Women who wanted to maintain their Czech citizenship, therefore, were pressured to only marry Czech men (Feinberg 2006). In other words, women were seen as instrumental to the concept of a Czech national identity insofar as they were responsible for ensuring that such an identity continued to exist via marriage and childbirth.

Women in communist Czechoslovakia

While Czech women arguably had more power and agency during the communist era that eventually followed independence and no longer had their citizenship determined by their marriages, their kinship ties with men — particularly their fathers and husbands — continued to be seen as important, especially with regards to suspicions of political dissent. Although many more men than women were arrested for political dissent under Czechoslovakia's communist regime, women were often still seen as “guilty by association” in the eyes of the state (Hignett 2016). For example, while women comprised only five to ten percent of those who were imprisoned for political dissent from 1948 to 1954, much larger numbers of women in Czechoslovakia were faced with state-sanctioned repression due to their familial relations with the tens of thousand of men who were arrested for opposing the communist regime. This state-sanctioned repression typically consisted of political harassment and socioeconomic

discrimination, including denied access to university education, loss of employment, and forced relocation, which effectively eliminated women's actual or potential source of income as well as their social ties (Martin 2009).

The continued importance of women's kinship ties with men during the communist period was contradicted by the growing number of rights that women were afforded, although even these rights were primarily administered in order to lessen the "social burden" that women and children traditionally place on society by not being productive members of the labor force (Paukert 1991). During this time, Czech women were heavily encouraged to join the labor force, and childcare was subsidized by the state in order to make full-time employment more feasible for women. At a time when women constituted less than half of the labor force in Western Europe and the United States, women in Czechoslovakia made up 61 percent of the country's labor force during the 1950s and their participation only continued to grow in the decades that followed despite the stagnation of the male labor force (Ferber and Raabe 2003). Additionally, there was little distinction made between the types of work that men were enabled to perform versus the types of work designated for women laborers. For instance, during the initial years that followed the Velvet Revolution of 1989, in which demonstrations against the one-party government ultimately led to the end of the communist regime and transition to a parliamentary republic and capitalist economy, women comprised approximately 25 percent of students who were studying informatics at the undergraduate level at Charles University in Prague. Barely over a decade after the Velvet Revolution, women constituted merely nine percent of students receiving bachelor's or master's degrees in computer science at Masaryk University in Brno, the country's second most populous city, as shown in Table 1 (Galpin 2002). The more recent data

from HoneyPot (2018) suggests that, with only about 11 percent of workers in the Czech information technology sector being women, the numbers have not significantly improved since Galpin conducted her research. Furthermore, at the start of the century, women constituted only a small percentage of those employed in ICT specialist positions such as IT specialists or software engineers. Among women whose jobs required intensive ICT usage, meanwhile, approximately 90 percent were employed in clerical or secretarial positions (Ferber and Raabe 2003). The significantly smaller presence of Czech women in what is often seen as a predominantly male field points to not only the degree of integration of women into the labor market during the communist era, but also the minimized focus on equal opportunities for women in the job market since the transition to capitalism, which is discussed in more detail below.

Country	Data	Year	Trend	Type	Source
Czech Republic	9.6% (51)	2001		UG, Inf	Ind, Masaryk U [9]
	25%	1989-94		UG&MSc, CS	Ind, Charles U [57]

Table 1: Percentage of students graduating with information technology degrees who are women at Charles University between 1989 and 1994, and at Masaryk University in 2001 (Galpin 2002). At 25 percent, the percentage of students in information technology degree programs who were women was relatively high in the early 1990s during the first years after the Velvet Revolution, but had fallen to under 10 percent less than a decade later. Galpin notes that an empty box in the “Trend” column signifies an inability to determine any trend in the percentage of students who were women, likely due to the fact that the data for the Czech Republic is derived from two different universities. “Type” refers to the degree level (“UG” signifies an undergraduate degree, while “MSc” signifies a Master of Science degree) and the field (Informatics and Computer Science, respectively). Finally, information in the “Source” column describes the source that provided Galpin with the data. In both instances above, the sources were both individuals (“Ind”) and the respective universities.

Women in the contemporary Czech Republic

Since the end of the communist era, the reduced presence of Czech women in information technology fields has been accompanied by a substantial digital divide along gender lines in the Czech Republic. During the first decade of the twenty-first century, when Czech research on the local digital divide was at its peak, the size and persistence of the gender digital divide was replicated across the former Eastern Bloc, despite the fact that gender is traditionally not considered a factor behind the digital divide in the rest of Europe (Simerska and Fialova 2007). While the proliferation of smartphones and the increased affordability of ICTs since then have narrowed the gender digital divide in terms of its formal definition, women in the Czech Republic are still statistically less likely than men to regularly use ICTs, and are also less likely to use social media to share their political views and provide comments on articles covering current events, preferring instead to interact with their friends and family members (Vochocová, et. al. 2015). Previous research suggests that the gender digital divide of the previous decade could at least partially be attributed to increasingly patriarchal power structures that accompanied the transition to free market capitalism and encouraged the creation of the gender wage gap in the Czech Republic, along with higher rates of unpaid work at home and less equal access to education (Vanhuysse 2006). These changes prevented many women from joining the labor force, and those who were able to work often found themselves less qualified for positions that require the use of a computer and thus provide access to ICTs at least during working hours (Walterová and Zalisová 2011). Although opportunities to learn more advanced ICT skills and pursue a career have increased in recent years as children learn these skills at school and young women born after the Velvet Revolution have started to enter the workforce, options for women

born prior to the Velvet Revolution who wish to pursue education and employment in the information technology sector later in life are few and far between, as the research findings below will demonstrate.

The gender digital divide, yesterday and today

The presence of a gender digital divide in the Czech Republic is troubling when one considers the fact that while access to ICTs quickly narrowed with respect to other social groupings, such as socioeconomic status and age, the gap between men and women's access and skill levels persisted throughout the beginning of the twenty-first century. During a five-year period analyzed by Lupač and Sládek (2008), the size of the digital divide along gender lines remained roughly the same even as the proportion of women with access to ICTs increased from 25.3 percent in 2003 to 41.5 percent in 2007. This lack of improvement, especially considering the near-disappearance of the digital divide in terms of other social categorizations, is indicative of ICT policy that worked to address inequality in ICT access and usage in the lives of those who are marginalized in Czech society as a result of their age, socioeconomic status, or education level, but has also largely ignored the lack of access to ICTs and the poor skill set amongst women. The lack of attention paid to gender in efforts to lessen the digital divide in the Czech Republic suggests that women's organizations and experts were not involved in these efforts and that there remains a dearth of digital skills training targeted towards women.

More recent policies have been somewhat more promising. While ICT policy in the Czech Republic still does not explicitly seek to improve women's access and skills, some women can indirectly benefit from policies introduced in recent years. The Strategy of Digital Literacy

of the Czech Republic from 2015 to 2020, for instance, partially addresses the gender digital divide by introducing a plan to “increase the ability of families to take advantage of opportunities and eliminate risks related to digital technologies in the family or at school” (Strategy of Digital Literacy of the Czech Republic 2015). By improving ICT access for families and encouraging the beneficial use of ICTs at home, the Strategy has the unintended but positive effect of also improving access and encouraging the development of more advanced ICT skills for women with school-aged children. However, while some women may indeed have more access to ICTs and the chance to improve their skills as a result of the Strategy, there is no promise of increased ICT access and skill development made to women without school-aged children. This is especially troubling for women who are simply too advanced in age to have school-aged children either currently or in the future, leaving them to continue to have some of the lowest rates of ICT access in the Czech Republic, as discussed below.

Furthermore, despite the current state of the gender digital divide and ICT policy in the Czech Republic, recent changes to both policy and the education system bode well for women’s improved ability and participation with respect to ICTs and the information technology workforce. School-aged children now learn how to use ICTs and interpret the information they find online as part of their curriculum, and the digital divide for young adult women and men today is much smaller than the approximately eight percent gap previously identified by Lupač and Sládek (Rambousek, et. al. 2012; United Nations Human Rights Office of the High Commissioner 2016). While current efforts have focused on ensuring that younger generations have access to and know how to use ICTs in an increasingly connected world, the differences in the gender digital divide between generations point to a particular lack of attention paid to the

technology and information literacy skills of women who came of age before computers and the internet were so pervasive. In a multi-country report on the gender digital divide, the United Nations Human Rights Office of the High Commissioner (2016) found that, in the Czech Republic, only eight percent of women over the age of 75 were using the internet, compared to 21 percent of men in the same age group. The low proportions of older individuals who use the internet are not surprising considering the fact that older adults throughout the world are much less likely to be online; what is surprising is the 13 percent difference in internet usage between women and men within this age group. This gap is several percentage points larger than the one measured by Lupač and Sládek (2008) between women and men of all ages during the previous decade, and is especially intriguing as the report also found that rates of ICT usage for women and men of all other age groups were approximately the same (United Nations Human Rights Office of the High Commissioner 2016). Unfortunately, little research concerning this crosscutting digital divide has been performed, signifying a relatively untouched area within the literature on gender and the digital divide in the Czech Republic and a potential area for future research.

Despite the positive changes seen in the Czech Republic, data from other countries suggest that completely eliminating the digital divide remains difficult. In the United States, for example, women comprise only 18 percent of computer science students at the undergraduate level, and as of 2018, only 29 percent of Silicon Valley startups have at least one woman on their board of directors (Thakkar, et. al. 2018; Silicon Valley Bank 2019). These low numbers persist despite the growing attention being paid to gender disparity in the American information technology sector as a whole and within specific subfields in recent years, as well as the greater

freedom that American women are perceived to have in terms of the careers they pursue. Within the United States, much of the gender disparity in the information technology sector has been attributed to the so-called pipeline between education and employment (Silicon Valley Bank 2019). In other words, the low numbers of women studying computer science and related fields at universities later contribute to the low numbers of women working and leading in the sector. While balancing life at home and a career is more common in the United States than in the Czech Republic, social attitudes towards women who are involved in the field still tend to be negative. As Rankin (2018) explains in her description of PLATO, established in 1960 as the earliest computer-assisted instruction system, women in the field have been belittled and questioned since the advent of information technology, partially contributing to their continued disinterest in active involvement in the field. As the research findings below demonstrate, negative attitudes towards women working in or even merely interested in information technology can also be found in the Czech Republic, indicating that this issue is not unique to the United States.

Cyberfeminism and the importance of women in information technology

While prejudice against and harassment of women may be more obvious in the information technology sector, such negative attitudes towards working women actually have their roots in earlier professions that were seen as stereotypically feminine. Expanding upon the cyberfeminist ideas first introduced by Haraway (1991) in her seminal essay “A Cyborg Manifesto”, Plant (1997) notes that women who worked in the textile industry during and after the Industrial Revolution were seen as less capable of producing high-quality garments than not only the new machines that they worked with, but also the men who were generally absent from

the factory floor outside of managerial positions. Plant goes on to declare that “textiles themselves are very literally the softwares linings of all technology”, clarifying both the validity of her comparison of the textile industry with the information technology, and the need for a new feminism focused on the relationships and even the similarities between women and technology.

As noted above, the concept of cyberfeminism and the similarities between women and machines were first brought to light by Haraway (1991), who calls for the rejection of the perceived differences between “human” and “machine”. She writes:

The international women’s movements have constructed “women’s experience,” as well as uncovered or discovered this crucial collective object. This experience is a fiction and fact of the most crucial, political kind. Liberation rests on the construction of the consciousness, the imaginative apprehension, of oppression, and so of possibility. The cyborg is a matter of fiction and lived experience that changes what counts as women’s experience in the late twentieth century. This is a struggle over life and death, but the boundary between science fiction and social reality is an optical illusion.

Haraway argues that women need to identify not exclusively with each other due to their shared experiences, but also — and perhaps only — with those people and machines with which they share similar degrees of complexity, allowing women and other oppressed individuals to create their own groups rather than merely be assigned to a group by those in power. The cyberfeminists who were and continue to be influenced by Haraway assert that women’s greater

understanding and experiences with such complexities make them a natural fit for work with technology, continuing their relationship with machines that Plant partially addressed in her discussion of women in the textile industry. Cyberfeminist work produced since the 1990s, for instance, has acknowledged that the dearth of women in information technology has shaped the functions of tools produced within the field. For example, Wajcman (2009) notes that smart home technologies are generally unable to complete common household tasks and instead only assist with the most basic of tasks, such as turning on the lights or adjusting the temperature in a room. She suggests that this oversight is the result of such technologies primarily being designed by men living in Western societies, where they often are not responsible for most household tasks and thus do not realize the need for technologies that can help the women who typically are responsible for these tasks. Because women are often underrepresented in discussions concerning the tasks that new technologies should be able to accomplish, their lived experiences and desires are rarely vocalized and included in the design process.

Women in the contemporary Czech Republic, continued

The persistence of negative attitudes towards women in information technology and the subsequent need for a cyberfeminist approach in combating these attitudes is accompanied by opposition to women's rights — as defined by Western feminists — by both the Czech government and Czech society at large. Generally, women's organizations in the country are still associated with the communist era, leading them to share the negative reputation that has been assigned to the former regime in the years since its end (Ferber and Raabe 2003). Similarly, because of the unique experiences that Czech and other Eastern Bloc women had during the

communist period, women in the region today are less likely to identify with the tenets of Western feminism. For example, while contemporary strains of Western feminist thought have identified equal opportunities in the labor market as a leading cause, Czech women who were old enough to be required to work during the communist era are more likely to desire the choice to exit the labor market and devote their full attention to their homes and families (Feinberg 2006). The belief that women should have the right to choose to stay at home and opt out of the labor market has been aided by the dismantling of the social safety net that was so integral to the communist regime but is now seen as being at odds with a capitalist economy (Argent 2008).

While Czech women in general may not identify with the Western desire to work outside of the home and earn their own income, leading Czech feminist scholars have clearly been influenced by the ideologies and priorities of Western feminism (although this may be due to the fact that many Czech feminist scholars have been educated outside of the Czech Republic and have thus been more exposed to the nuances of Western feminism and the societal features that have informed it). One example of an institution that is more aligned with Western feminism rather than the average Czech woman's wish to stay out of the labor market is the Gender Studies Library located in Prague. While the collection at the Library addresses a variety of issues that impact women, staff are currently interested in accumulating materials that relate to equal opportunities for women, particularly in the job market (Gender Studies Library 2019). While the notion that women should have the right to choose to stay at home rather than work persists, a growing number of groups working to address the country's gender wage gap suggests that women in the Czech Republic are becoming increasingly aware of and concerned about this particular issue. In the information technology sector, for example, women earn an average of

32.5 percent less than their male counterparts (Honeypot 2018). Despite the growing awareness of the gender wage gap and other issues related to women in the workforce, there have thus far been few attempts from the government to address the disparities that women face as they struggle to qualify for the same positions and salaries as men.

In addition to the significant difference in the numbers of women and men working in the Czech Republic's information technology sector, the gender digital divide is also characterized by different usage patterns. Women are more likely to restrict their usage of ICTs to basic tasks such as performing searches and staying in touch with friends and family, while men are more likely to be creators of content that will be consumed by users outside of their immediate circle. This is reflected by the findings of research on Czech women's use of social media to vocalize their political views and opinions to the public, which indicate that women are significantly less likely than men to publicize their thoughts via creating, sharing, and commenting on social media posts or interacting with politicians' social media pages, as shown in Table 2 (Vochocová, et. al. 2015). As will be further described below, however, my own findings suggest that women may simply appear to not contribute to political and other discussions online out of concern for their own safety, and actually do participate in these discussions under the guise of male pseudonyms.

	Women (%)	Men (%)
Liking politician's or party post (+)	21	26
Sharing contributions by politicians or political parties	15	18
Commenting on posts by politicians or political parties (*)	10	16
Commenting on a friend's contribution about the elections (**)	19	28
Adding comments or information concerning elections on one's own profile (*)	7	12
Becoming a fan of a politician or a political party	11	15
Becoming a fan of another political initiative related to elections	6	5
Commenting index: At least one of the three commenting items (**)	24	34

Note: Pearson chi-square** $p < .01$; * $p < .05$; + $p < .1$. Missing values do not exceed 2% of the values for any item. The commenting items constituting the composite index (last line) have bivariate Pearson's correlations of .40; .41 and .42 which accounts for Cronbach alpha = 0.66, an acceptable value given that only three items enter the index.

Table 2: "Percentage of women and men who interact with politicians and political parties on social media" (Vochocová, et. al. 2015).

Outside funding for increased ICT access for women and improved representation in the information technology workforce in the Czech Republic have been inadequate thus far. Institutions such as the European Union and nongovernmental organizations often are either more concerned with other facets through which the digital divide manifests itself or simply unaware of the extent to which the digital divide affects women in the country and the negative perception of working women and organizations seeking to encourage their employment have been assigned due to their perceived association with the former communist regime (Adomi 2010). This lack of attention and awareness is further compounded by the existence of other countries where the digital divide, along gender or other lines, is even wider than it is in the Czech Republic. Understandably, such countries tend to be prioritized when institutions make decisions regarding how to allocate their funding as the need for access to ICTs and knowledge of how to use them is more severe.

The lack of funding from the European Union in particular towards closing the gender digital divide in the Czech Republic is not surprising considering the EU's historical attitudes towards bridging the digital divide in Europe as a whole. Rather than creating a fund that sets

aside money for the purpose of ensuring universal access to computers and the internet, as the United States has done with the Universal Service Fund in order to bring computers and internet connections to schools whose budget do not allow for them, the EU began its efforts to push for universal access via regulation (Bilbao-Osorio 2014). Much of this early regulation focused on simply ensuring that access is provided, but the EU has since evolved its efforts to include skills training. The need for skills and information literacy training was first recognized by the EU in the Riga Declaration of 2006, which also identified several policy areas for digital inclusion. While the text of the Riga Declaration acknowledges the differences in women's and men's access to and usage of ICTs, it does not include women in its list of groups to target in the provision of training (World Wide Web Foundation 2015). As it stands, the gender digital divide in the Czech Republic and elsewhere in Europe remains mostly untouched by the EU.

Thus far, research on the gender digital divide within the Czech Republic has primarily concerned itself with basic access to ICTs and occasionally made forays into the different reasons women and men use ICTs. This research has generally concluded that women have less access to ICTs than men because they earn smaller wages and thus are less able to afford technological devices, and less advanced ICT skills because traditionally feminine roles such as secretarial positions do not require women to possess skills beyond the basics. However, much of this research was conducted at least a decade ago, and thus does not reflect the current reality in which ICTs are both more affordable and more accessible but women are still underrepresented in information technology education and careers. Additionally, the existing research does not consider the cultural and historical reasons that women are less likely than men to work in information technology or share their opinions online. With this in mind, I set out to uncover the

ways in which the various topics discussed above are all related and come together to discourage women from joining the information technology workforce, as well as contemporary efforts to improve women's presence and experiences in the field.

Methodology

The majority of the original research for this paper was conducted through both in-person and remote interviews with relevant academic faculty members, librarians and other information professionals, and women who have been involved with efforts to increase the presence of women in information technology fields in the Czech Republic. The interviews aimed to answer several questions that I identified as critical to developing an understanding of the current state of the gender digital divide in the Czech Republic. The research questions were informed by the theoretical framework identified above. As a result, they suggest that women should both have increased opportunities to use ICTs at a more advanced level and be more involved in the development of new technologies. The research questions consisted of the following:

1. Why are women in the Czech Republic significantly less likely to be employed in the information technology sector?
 - a. What is the relationship between the degree to which a country has democratized following communism and the extent of gender disparity in the information technology workforce?

- b. What is the relationship, if any, between the gender digital divide of the previous decade in which women had less access to ICTs, and that of the current decade in which women are less represented in the information technology workforce?
2. What is the impact of the Czech gender digital divide on women's usage of ICTs?
 - a. How does women's usage of ICTs differ from that of men?
 - b. To what extent does their usage truly differ versus simply appear to differ due to women's need to protect themselves online through the use of male pseudonyms and other means?
3. How have democratization and the transition to capitalism in the Czech Republic impacted women's access to and usage of ICTs?

Five preliminary in-person interviews were carried out in May 2018, when I visited the Czech Republic for two weeks as part of a graduate seminar conducted by the School of Information and Library Science at the University of North Carolina at Chapel Hill. These early interviews, all of which were with faculty members at the Institute of Information Studies and Librarianship at Charles University in Prague, lasted about one half-hour each and aimed to develop an understanding of local issues in information science more generally, leading me to further pursue the topic of women's relationship with information technology. Six in-depth, hour-long remote interviews, meanwhile, were conducted between January and March 2019 via the Zoom video conferencing software. One of these in-depth interviews was with a participant who had already been interviewed earlier, while the remaining five interviews involved new participants. Before beginning the second round of interviews, I employed snowball surveying

with the first round of participants to solicit suggestions regarding additional individuals who could provide further information and insights regarding the Czech gender digital divide and the ways in which women have come to navigate it and see themselves as more than simply consumers of digital content. Additional participants were identified from existing research on the topic as well as websites for organizations working to provide ICT education to women. Many of the individuals I reached out to for interviews readily provided referrals to even more potential participants, especially when they themselves did not feel qualified to speak about the subject matter.

The initial interviews with library and information science faculty were primarily driven by a desire to understand the current landscape of the digital divide and other issues in the information sciences in the Czech Republic. My primary goal while conducting the preliminary interviews was to develop an awareness of the groups most affected by the digital divide in the Czech Republic today, particularly given the fact that the demographics of the country and the rest of Europe have shifted substantially due to migration from outside of the continent. These demographic shifts have serious implications for the validity of the previous research on the topic, especially since much of it has not been updated or revisited during the past decade. I was also curious about the ways that various institutions have attempted to remedy the lower amount of information access afforded to women in particular. These institutions include libraries and nonprofit organizations that provide educational opportunities for women seeking to develop their technological skill sets and potentially find employment in the information technology sector. Findings from these early interviews are described in the following section.

All participants who contributed their knowledge and expertise via interviews currently live and work in the Czech Republic, and with the exception of one participant, all also grew up in the Czech Republic and experienced the transition from communism to capitalism and the various social changes that have accompanied it. Due to some uncertainty on the part of potential participants regarding their ability to adequately answer interview questions, the number of actual participants was lower than expected, with only six of the people contacted for an in-depth interview agreeing to participate. Despite this low number, the six participants represent a variety of professional backgrounds and interests, and many of their responses to the interview questions appeared to echo each other. All of the participants were in their thirties or forties, so all but the one participant who grew up outside of the Czech Republic experienced the transition from communism to capitalism and obtained their postsecondary education after the Velvet Revolution. All of the participants were women, and all were based in Prague. A breakdown of the job titles of each participant can be found in Table 3.

Participant category	Job title and field, if faculty
Academic Faculty	Lecturer (Media Studies)
Academic Faculty	Vice Rector (Education)
Librarian	Librarian and Deputy Director
Librarian	Academic Consultant
Organizational Affiliate	Technology and Course Development Director
Organizational Affiliate	Project Manager

Table 3: Breakdown of those who participated in the hour-long, in-depth interviews by professional category and job title. Academic fields are included for those participants who are faculty members.

Each participant was asked a different set of questions based on the fields they represent. Interview questions for academic faculty members, for instance, covered the contemporary roles and expectations of women in Czech society, and how those roles and expectations may impact women's usage of ICTs and their ability or willingness to seek employment in the information technology sector. Interviews with academic faculty were complemented by interviews with librarians working in public libraries and other information professionals in the Czech Republic, some of whom I had the opportunity to meet during my time in the country. The librarians I interviewed were asked to describe how their libraries chose which services to offer outside of basic information access, how they learned that particular issues were present and unaddressed in their communities, and the extent to which these services for women include digital skills training and career preparation. The provision of social services provides libraries with a unique opportunity to implement skills and information literacy training for those who benefit from such services.

The third and final group of interviewees consisted of individuals who are currently involved with organizations that were intentionally formed to provide women with educational opportunities to acquire the skills needed to gain employment in the information technology sector. This group of interviewees was asked about their experiences with women's organizations in the Czech Republic more generally, as well as their perceptions of women's usage of ICTs. They were also asked to consider the effects of the gender digital divide on their ability to successfully conduct outreach to potential students and the form that their outreach has taken. The goals of the interviews with those working with organizations that provide educational opportunities was to develop an understanding of how they navigate the gender

digital divide to reach new students and cement positive changes for both the information technology sector and women in the country, and to learn more about the ways that women learn about these organizations and the factors that encourage them to pursue an education with them.

After all of the in-depth interviews were completed, notes from each interview were compiled and organized into an affinity diagram in order to identify common themes across all six interviews. Quotes from different participants that addressed similar issues were grouped together to arrive at these themes. The three primary themes that were identified within the affinity diagram were the role of the Czech educational system and cultural expectations in preventing more women from pursuing careers in information technology, the effect of cultural expectations and attitudes on women's participation in online discussions, and the growth of nonprofit organizations working to provide women with a second chance to enter the information technology sector. These themes are further discussed below.

Findings and discussion

The role of the educational system and cultural expectations

Several common themes emerged throughout the six in-depth interviews conducted for this study. Firstly, nearly all of the participants noted that a combination of the structure of the educational system in the Czech Republic and societal and familial expectations of women makes it difficult for many women who wish to pursue schooling and careers in information technology fields to do so. Students in the Czech Republic who enroll in universities are expected to select career paths before applying to degree programs, and it is notoriously difficult for students, both female and male, to switch into a different degree program once they have

already started attending university. Thus, female students who initially feel pressured to study more traditionally feminine subjects at university and become interested in information technology later in their studies are typically unable to pursue degree programs in the field. One participant suggested that “We need more IT training before we select educational paths. IT schools are expensive, so many women can’t change their careers.” With greater awareness of what information technology fields entail before entering university, students will be able to make a better informed decision when they select a degree program.

Meanwhile, female students who are able to pursue an education in information technology may not necessarily be welcomed by the male students in their degree programs. One participant who works at a technical university noted that “there is no discussion of gender on [her] campus,” and that activities such as programming are generally viewed as “hobbies” when women are the ones participating in them. Such negative attitudes towards women in the field at an early phase in their careers may further convince female students to pursue other areas of study instead, a possibility that represents one potential future topic of research.

The rigid structure of the Czech university system combines with social and familial expectations of women to further dissuade them from pursuing degrees and, ultimately, careers in information technology. As another participant explained, “men are still the providers, so women are discouraged by their families from pursuing an education in technology.” Because men are still seen as the breadwinners in Czech families and women are pressured by their families to have children and then care for them rather than going back to the workplace, they may have difficulty justifying to themselves and their families the choice to enroll in degree

programs that require more effort to complete but also lead to higher wages, regardless of how interested in information technology they may be.

Likewise, it is difficult for women to shift to careers in information technology once they have already started a career in another field as they often have not acquired the more advanced skills needed to qualify for a job in information technology. Despite the narrowing of the gender digital divide as it is traditionally defined in recent years, a divide with respect to the actual skills and usage of ICTs still persists between women and men. One participant observed that many women maintain their family-oriented roles in online spaces, centering their ICT use around social media and shopping rather than more technical activities. Another participant noted that even when women do have jobs that require them to use ICTs, they often hold positions as secretaries and other administrative roles that do not necessarily require them to use ICTs to create original content. The expectations of women both at home and in the workplace therefore prevent them from obtaining more advanced skills with respect to ICTs as they are not given a reason to need these skills or an opportunity to practice them.

Women in online discussions of politics and social media

Participants were also asked to address the aforementioned research that has found that Czech women are significantly less likely than their male counterparts to share and comment on social media posts related to politics and current events. One participant whose research focuses on this topic provided related statistics, noting that women comprise approximately 21 percent of “likes” on Facebook pages for Czech political parties and 11 percent of authors behind online newspaper comments. She attributed these low numbers to the fact that “Women’s roles at home

lead to less participation. Because of their at-home responsibilities and verbal abuse of women in online discussions, they mostly observe.” In addition, both she and other participants suggested that other factors also play a role in preventing women from fully participating in these discussions. Two participants suspected that the number of women actively involved in political discussions online is higher than the research indicates because some women adopt male pseudonyms and personas when participating in these discussions in order to avoid verbal abuse. The fear of verbal abuse in these spaces also makes it more likely that women simply observe rather than participate in these discussions. These personas tend to come across as more aggressive than women who are open about their gender in political discussions online or who prefer to discuss politics in more protective spaces such as parenting forums, making it difficult for researchers to accurately estimate the true number of women involved in these discussions.

A second chance to learn advanced ICT skills and transition into the field

Finally, there are currently several nonprofit organizations in the Czech Republic that are working to overcome these obstacles to women’s involvement in the information technology sector and provide women with instruction in the field at an affordable price. One participant who helped found such an organization shared that one of the groups her organization targets is women who are returning to the workforce after spending three (or more, in the case of women who have multiple children) years on maternity leave. In the Czech Republic, new mothers are provided up to three years of maternity leave, during which time they receive a monthly allowance from the state based on the amount of social insurance they have already paid — thus, mothers with higher incomes receive greater financial benefits (Valentova 2012). When women

attempt to return to their positions after maternity leave, they often find that they have been replaced and are no longer needed at their previous workplaces. While many women simply decide to pursue similar opportunities with other companies, others see this as a chance to enter a new field and possibly earn higher wages to support their growing families. Czech women who are already involved in the information technology field have recognized this new demographic, and are meeting the demand for education by both starting nonprofit organizations that address this need and initiating partnerships between these organizations and companies that are interested in hiring more women, introducing another pipeline from education and employment in the field. At least in the case of this participant's organization, she and the other founders were initially only interested in meeting and supporting other women already working in information technology, and decided to expand their operations upon learning about growing interest in switching to a career in the field amongst women who already had careers elsewhere. In addition to using their expertise to provide instruction, the leaders of the organization also use their connections within the field to identify companies that wish to add more women to their ranks. Many of these companies also help subsidize the organization, allowing students to pay less than they normally would to attend one of the schools mentioned above by another participant. With regards to self-promotion, the aforementioned participant noted that her own organization has had to conduct very little marketing. Instead, information about the organization has primarily spread through word of mouth, as women who have successfully completed the programs and gained related employment often recommend the courses to other women who are also interested in a new career in information technology.

This emphasis on equipping women with the skills needed to gain employment in the information technology sector regardless of age or life experience is reminiscent of the work of other women-focused organizations throughout the country. During the preliminary interviews, for example, I learned that public libraries are increasingly providing services geared specifically towards women, such as support circles for women who are survivors of domestic violence. While the fact that public libraries, particularly ones located in rural areas, are beginning to provide social services for their communities can be attributed to the unsustainability of nonprofit organizations in these parts of the country, the choices made with regards to which social services are offered still suggest some degree of familiarity with the inequities between Czech women and men today. The shared concern for these inequalities represents a potential area for collaboration between public libraries and organizations striving to increase women's presence in the information technology sector. The participant who helped found the nonprofit organization discussed above acknowledged the need to expand operations to rural areas of the Czech Republic, noting that "there has been a lot of interest in community learning in larger cities, but [they] need to spread more information in smaller cities." Furthermore, women who attend support circles for survivors of domestic violence may also be in need of a way to support themselves and others financially, and thus can be referred to organizations that will help them gain skills and employment in information technology. Such a partnership was not mentioned in any of the interviews conducted, suggesting that this idea needs to be explored further or perhaps even for the first time.

Conclusion

This paper has presented a review of the existing literature concerning the gender digital divide in the Czech Republic, as well as the findings of original qualitative research about the factors that continue to keep women out of the information technology sector and from advancing their technology skills. According to participants, the primary causes of gender parity in the Czech information technology sector are traditional expectations of women and a rigid educational system. Together, these factors dissuade women from pursuing degree programs and careers that require greater effort but also come with greater pay, as such fields are stereotyped as masculine and many women do not see themselves as potential breadwinners. There are, however, several organizations throughout the Czech Republic that are working to address this issue and provide education and employment guidance to women who wish to train for a career in information technology later in life. The presence of a training-to-employment pipeline within these organizations, along with partnerships with relevant companies, suggest that there is an active interest within the Czech information technology sector in increasing the number of women in the field. It will be interesting to observe how the gender divide within the sector shifts in the coming years, in addition to how the technologies produced may differ from those of previous years with regards to the tasks they are able to complete.

With regards to the participation of women in online discussions concerning politics and current events, more research needs to be conducted to determine the true number of women involved in these discussions. This can be difficult as some women adopt male personas in order to avoid verbal abuse in these spaces. One potential route that researchers can take to circumvent this obstacle is to engage with women who are politically active offline and conduct interviews

with them to learn about the ways that their self-presentation online may differ from their realities. Another potential route is to reach out to women who freely vocalize their opinions in more protective spaces, such as online parenting forums, and ask them about their involvement in other online spaces and how their self-presentation differs between these different kinds of online realms.

The main limitation in this study was the low number of people who agreed to participate in interviews and share their knowledge and insights. Of the 25 people whom I reached out to for in-depth interviews, only six agreed to be interviewed. As noted above, many of the people I contacted for interviews did not feel that they knew enough the gender digital divide and women in the Czech information technology sector to adequately contribute to my research, even though many of them had authored articles on these topics. Another limitation of the study is the types of people who were interviewed. All of the interviewees were women in their thirties or forties based in Prague, and all were primarily involved in research or instruction rather than studying or working in information technology themselves. If I choose to continue researching the gender digital divide in the Czech Republic, I will widen the scope of individuals I reach out to for interviews. For example, it would be worthwhile to interview men who are involved in information technology to better understand the male perspective with regards to women in the field and women in Czech society as a whole. It would also be especially valuable to speak with women who have studied with any of the organizations that are working to provide education and, ultimately, employment to women with an interest in information technology. These interviews would provide more information about how women first learn about these organizations, how they decide to pursue a second career in the field, and how they view their

experience with the organizations. Learning about these women's experiences will add a new dimension to the findings described above and illuminate how the women who are most directly impacted by these programs and involved in the sector view the evolving relationship between women and technology.

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