Women Want to Learn Tech: Lessons from the Czechitas Education Project

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Abstract—While it is understood by women that tech fluency might act as a powerful career accelerator or even a new career direction towards software engineering, this awakening often comes after graduation from a different field, when it is difficult for the women to make the shift towards tech and computing. In this paper, we report on our experience with running a successful education non-profit called Czechitas, which shows that women in their 20s and 30s are (maybe surprisingly) highly interested in learning tech, they just need a helping hand and tailored assistance, encouragement and guidance.

I. INTRODUCTION

Across the world, as few as 10–25% of tech professionals are women, with many women dropping their interest in tech for preventable reasons. This is a major issue for both the current and future jobs market, as Europe alone faces a shortage of hundreds of thousands skilled tech engineers to date \cite{1,2}. Moreover, the concerns are related also to the impact a tech background can have on a women’s career, and the economic potential that accompanies it \cite{3,4}.

Many studies have been conducted to date to reveal that in early education, girls and boys are equally touched by technology, computing and software engineering. But as adolescents (age 13 to 18), girls become much less interested in these topics, with limited recovery during the next 10 years that are crucial in terms of career choice \cite{2}.

While these vulnerable years and all factors that influence whether girls keep their interest in tech or not are very well studied and understood \cite{2,5,6}, barely any attention is paid to the period in life of young women some years after graduation when they reconsider their career choice (we call it reconsideration years, typically between 25 to 30 years of age). In our experience, this time might be linked to the moment when some of these women plan starting a family and consciously rethink what shall be the career they want to come back to after maternity leave.

Experience shows that during these reconsideration years, the interest in tech and software engineering among young woman raises again due to prospective opportunities that tech offers \cite{2,7}. If however a helping hand is not in reach to the young women, the interest goes in vain.

In this paper, we report on our experience with helping young women during these reconsideration years to find their way into tech, encourage and educate them. All that within the Czechitas non-profit education project, started specifically for this purpose in the Czech Republic, where the ratio of women in tech is the second worst in EU (see Figure\textsuperscript{1}). Within Czechitas, we assist these young women in their learning path, we guide them towards specific technologies, and advise them in their career decisions. We connect them with professionals in the respective fields, and create welcoming community environment for them to learn from each other. Besides sharing this experience, this paper explains what kind of helping hand is needed during the reconsideration years so that the interest of these women in tech turns effective.

II. THE STORY OF CZECHITAS

Czechitas \cite{9,10} is a Czech non-profit organization that has emerged in 2014 from a simple idea to bring tech closer to girls, and girls closer to tech. Over the time, this idea has attracted a strong community of tech professionals, companies and volunteers, and gave rise to a portfolio of female-tailored courses in various areas of tech and software engineering, such as programming, web development, mobile app development, data science, testing, digital marketing and graphic design.

Thanks to the success of our education activities, consisting of hundreds of events a year (each receiving multiple times more registrations than its capacity), we have become recognized as the leading platform in the Czech Republic actively addressing gender diversity in STEM. We have also been recognized abroad with numerous European as well as overseas awards, e.g. becoming the first organization from the Central Europe awarded the prestigious Google.org grant in
Fig. 2. When looking back, what was the biggest obstacle for you when considering joining tech? [7]

2015, and in 2018 becoming the first organization worldwide being awarded the Google.org grant for the second time [9].

We have influenced over 10,000 women who graduated from our courses to either choose or change their career path to tech or use their new tech skills to advance their careers. Besides students, our community includes lecturers, professionals, partner companies, volunteers, the core team and social media audience (community of 15,000+). Even though the core team includes only 30 employees, we have the support of more than 350 volunteers actively involved in our activities (tech professionals, 40% female).

III. KEY FACTORS WHEN RECONSIDERING TECH

Tech by itself is an appealing career choice, with high salary, job security, working flexibility, space for creativity and career growth. What is interesting then are the factors that negatively influence the decision to pursue tech career among women.

During the adolescence of girls, social encouragement and tech exposure in school, together with self perception and career perception are reported to be the key controllable indicators for whether or not girls decide to pursue a Computer Science or tech path [5]. While numerous other studies exist that examine the vulnerable years and confirm these findings [6], [2], little is known about the factors that play the key role during the reconsideration years, hindering the decision in favour of tech.

In 2017 we have surveyed 302 participants of Czechitas events together with representatives of 36 companies to understand these factors [7]. Our findings (see Figure 2) very well match the conclusions of Harvey Mudd’s President, Maria Klawe, who compiled their experience in three points, saying "Number one is they think it’s not interesting. Number two, they think they wouldn’t be good at it. Number three, they think they will be working with a number of people that they just wouldn’t feel comfortable or happy working alongside [3]."

Let us elaborate on these three points and add our observations, resulting also in a fourth point, which is that young women during reconsideration years critically miss guidance in learning.

A. They think it’s not interesting

Alarming effect of low exposure of girls to tech was described by Google in 2014, showing that the unfamiliarity with tech alone causes inclination to negative connotations with tech as a domain [5]. The study found that no matter if the girls were exposed to tech via compulsory or elective classes, the exposure itself was enough for them to characterize tech in much more positive terms. While girls unfamiliar with tech were using words like "boring, hard, difficult", girls previously exposed to tech used words like "future, fun, interesting, exciting" (see Figure 3).

One of the first corrective tasks we need is then to turn around the perception of tech that young women have due to their low exposure to tech in the past. Without that, young women have difficulty to perceive tech as a career that fulfills both the creative passion (inventing, problem solving, exploration, etc.) and the intangible, social passions (helping people, conservation, medical breakthroughs, etc.) that make a profession personally rewarding [5].

B. They think they wouldn’t be good at it

The key factor in our study among women participants of Czechitas courses is the perception of their own proficiency in tech (see Figure 2) [7], [5]. Interestingly, the perception is rooted more strongly in their confidence than objective reasons, which is commonly observed as the Confidence Gap between men and women reported in various fields [11].

Similar conclusions have been drawn in mathematics, where although standardized tests indicate that girls score just as well as boys in math, and that in school grades, girls often even outperform boys [12], girls tend to have higher levels of math anxiety and lower levels of confidence in their math skills. In other words, even when girls show similar performance levels to boys, they are often less sure of themselves, which applies to math as well as tech [13].

C. Who they will be working with

In our experience, women we teach are highly concerned about the work environment they shall once belong to, being afraid that they might end up working with people that they would not feel comfortable working alongside [3]. And indeed, some studies report that 27% of women cited discomfort with
their work environment as a factor why they left their IT job. Furthermore, workplace policies not suited to women also play a role [1]. Our study moreover shows that women perceive work in tech jobs as absent of communication among people (only 1% considered soft skills useful in tech career in our study [7]), which they do not feel comfortable with.

D. Missing guidance

In one form or another, young women during their reconsideration years feel lost when navigating tech education on their own. Helping hand or guidance during that time is at the end what decides whether they engage in tech education or not. Sometimes, they only need a direction, such as somebody who helps them to decide what programming language to start with. There is no universal answer to this question, which is why they often feel confused when they try to find the answer online. Moreover, they often ask how much time they shall be ready to invest before seeing results (e.g. in terms of an application they would like to develop), what learning path takes them to a specific job interview, which of the thousands of online courses they shall start studying. Then during learning, they often get stuck on trivial mistakes, which they find impossible to debug without help of another person. And they miss community of like minded female students.

IV. OUR SOLUTION

Research by Accenture and Girls Who Code concludes that improving universal access of women and girls to tech and computing will not by itself address the gender gap. They instead suggest that only by tailoring courses to girls specific needs can we boost their commitment to computing [6]. In this section, we discuss what such tailoring means to us.

A. Community

We build a community of girls and women who learn to code, as we see that community feeling is one of the key factors in retaining these tech students. All our events have very informal and friendly atmosphere, with team building activities and food sharing, to enforce the community feeling.

B. Safe environment and encouragement

Besides a lecturer, each of our coding events (for 30 participants) features around 5 more teacher mentors (we call them couches) who provide individualized help, support and encouragement to the students. Couches often sit by the students, helping them with whatever difficulty they have, which creates friendly atmosphere in which the students feel comfortable asking questions and reporting troubles they are facing (i.e. safe environment for trial and error). It moreover facilitates varying pace of each participant, thanks to which everybody can study on the speed that best fits their needs. This is in line with a study that shows that over a half of the girls learning tech would like to receive more active encouragement from teachers [2].

C. Practical experience and hands-on exercises

All our events feature many fun and creative hands-on exercises. Studies show that the more practical experience a girl receives during her education–inside or outside the classroom–the higher interest in STEM she builds [2]. Creativity in the classroom is also key. Girls who like STEM enthuse about being able to choose their own projects or go on field trips where STEM subjects are brought to life.

D. Real-life applications

Our experience supported by studies also shows that women become more interested in tech once they are able to conceive how tech can be applied to real-life situations and how relevant it might be to their future [2]. This is why we integrate real-life applications and projects in our activities.

E. Role models

Having visible female role models sparks women interest in tech careers and helps them to picture themselves pursuing these fields. This is why we organize meet-ups with inspirational female engineers and organize Czechitas Thesis Award, which showcases examples of excellent graduation theses in tech from Czech universities, drawing attention to talented girls who are passionate about tech.

F. Career guidance

We offer women a helping hand on their career path, from the initial decision about the field of study to the job interview. We organize annual Job Fair, which is a vibrant event where our community of students, mentors, lecturers and volunteers can meet our partner companies. The vision of this event is to get these two groups together for one day and provide them with specialized content, including career and IT workshops for our community and gender or educational workshops for our partner companies.

G. Partnering with companies

It has been recognized that young women are more likely to pursue tech careers when they are confident that men and women will be treated equally working in these disciplines [2]. We have observed that women feel much more confident when filing their job application to a Czechitas partner company, because the fact that the company partners with us gives them the reassurance that they are welcome at job interview. We also educate our partner companies about gender bias within the hiring process and what makes them more/less attractive employer to women.

V. FORMAT OF EVENTS

A. One-day workshops

The most popular format of our events are full-day workshops, taking place typically on Saturdays or Sundays. These focus on introduction to programming, web and mobile apps development, embedded systems, graphic design, data science and digital marketing. Most popular programming languages are Javascript, Python, Java, C#, PHP, Kotlin, and Swift. The topics also include various software engineering essentials,
such as testing, agile development, project management, security engineering, or version control.

The aim of one-day workshops is to spark interest in the attendees about coding and other areas of software engineering, and to give them necessary encouragement and guidance to study further.

B. Long-term courses

We yearly organize over 20 spring and autumn courses, focusing mainly on various programming languages and technologies (most popular are Java, C#, Javascript, PHP, HTML/CSS, Android, UX design, testing). Each of these courses comprises of 10-14 evening sessions of 2-3 hours each. The aim of long-term courses is to teach women a specific programming language or tech skill, and equip them with confidence for starting their own software development.

C. Re-qualification academies

For the women who made the decision to change the career, we offer an intense re-qualification program, which involves three months of lectures, hands-on exercises, and mentoring, called Digital Academy. Throughout the Academy, students participate in internships with companies and work on their final graduation projects. We offer them career services focused on professional transit to tech.

We have developed this unique type of re-qualification program (with successful 70% placement of the graduates on junior job positions in partner companies) for two fields: (1) data science and (2) backend web development in Java. The Digital Academy: Data includes teaching blocks on data mining, data processing and visualization tools, statistics, digital marketing, SQL and databases, data science and discovery, and Python as the programming language. The Digital Academy: Java focuses on key skills and technologies needed to develop web application with the focus on its backend in Java.

D. Hackathons

To promote creativity and confidence among participants of our courses, we organize hackathons, where the women can test their knowledge during intense work on a full frame team project under the supervision of experienced mentors. The hackathons are organized both as stand-alone events and as part of the academies and other intense education programs.

E. Coding clubs and Internships

Coding clubs and internships give girls the opportunity to work on a long-term team coding project under the supervision of an experienced professional. In case of the coding club, the team meets 2-4 times per month to discuss their progress on the joint project. In case of the internship, the woman becomes part of a team in a company that provides support for her to learn in practice.

F. Czechitas New Generation

Over the years, we have become recognized as a platform with the ability to guide newcomers to tech. Thanks to that, we have been invited to engage in tech education of children and youth in the Czech Republic. Since then, we have not only been active in advancing tech education among kids (engaging female role models in teaching), but also in equipping their school teachers with the necessary skills to make tech education accessible and fun.

VI. Conclusion

This paper reports on our successful education project, called Czechitas, which supports women when restarting their career and changing direction towards tech and computing. The project enjoys large popularity, and hence is now growing into multiple new cities within the Czech Republic (from 5 cities where we have our teams now, growing to 3 more cities in the next two years), while enlarging its portfolio with new topics and forms of learning (building an online learning platform now), as well as support for educators (training of tech teaching skills, organizational platform for knowledge sharing and methodical support). Moreover, we are now putting effort in improving the way Czech schools approach tech education, to prevent the low female engagement in tech, which we are correcting now.

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