ROBISZ.TO

SUMMARY REPORT

"PAKT FOR WOMEN"

“PAKT for Women” was implemented by the Robisz.to Association with funds from the Ministry of Digital Affairs (Poland).

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INTRODUCTION

PAKT[1] for women is a project that raises competences (practical skills necessary in modern industry and in creating specialist design portfolio, using digital machines) thanks to the implementation of stationary and online trainings within 5 thematic cycles:

1. **3D:** computer graphics in spatial design in Industry 4.0 (45 clock hours).
2. **2D:** practical use of computer graphics in digital fabrication (45 clock hours).
3. **IoT:** creating simple Internet of Things (IoT) devices using AI (45 clock hours).
4. **JS:** programming: JavaScript basics (60 clock hours).
5. **Python:** programming: Python basics (60 clock hours).

Topics and type of the training	Assumed number of participants	Participants who started the training	Participants who completed the training
3D (stationary)	98	101	86
2D (stationary)	60	63	59
IoT (stationary)	10	11	8
JS (online)	90	90	65
Python (online)	90	93	83
Total:	348	358	301

The target group of the project are women living in the area of the project implementation (south-western macroregion covering the Opole and Lower Silesian Voivodeships), with special emphasis on women at risk of social and digital exclusion:

- from outside large urban agglomerations, from smaller towns and rural areas.

- less educated (without higher education).

- after maternity leave / unemployed / entering the labor market.

- in a difficult life and financial situation, single women.

The project was implemented in July-November 2024.

[1] PAKT is the acronym of the Pracownia Aktywnego Korzystania z Technologii (Workshop for Active Use of Technology), which the ROBISZ.TO Association runs in the south-western macroregion.

METHODOLOGY

The report was prepared on the basis of existing and elicited data (quantitative and qualitative).

- Existing data: project application forms (N=630).

Demographic data and information on professional and personal situation were used in the analysis and in selecting the sample for interviews.

- Quantitative data elicited: ex-ante and ex-post online surveys completed by participants (N=301).

The analysis was used to estimate the level of achievement of project indicators concerning acquired competences. Participants were asked to assess their knowledge and skills, as well as familiarity with sources of knowledge in the scope of the training topics, before the start of the training and after the last session. The questions used a scale of 1-5, where 1 means a low level of competence and 5 a high level. In order to assess the increase in knowledge, skills and familiarity with sources of knowledge at the individual level, the assessments of each person from both measurement moments were compared in the following way: from the individual self-assessment of the level of knowledge, skills or familiarity with sources of knowledge after the end of the training, the assessment of the level of knowledge, skills or familiarity with sources of knowledge before the start of the training was subtracted - a result greater than zero means an increase in a given type of competence of a specific person. In the next step, the percentages, and averages of changes in the level of competence of people from all trainings were calculated from the data obtained in this way, separately for knowledge, skills, and familiarity with sources of knowledge.

An increase in competence is considered to occur when the participant declares an increase in the level of competence on at least one of the three monitored dimensions – knowledge, skills, or familiarity with sources of knowledge.

An additional measure of the level of competence were knowledge tests which all participants took after completing the training.

- Qualitative data elicited: 8 individual in-depth interviews (IDI); 1 online focus group interview (FGI).

A purposive sampling was used – the survey participants included participants of all trainings and people from both voivodeships.

		FGI (6)	IDI (8)
Training topics	3D	0	3
	2D	2	2
	IoT	0	2
	JS	1	1
	Python	3	0
Voivodeship	Lower Silesia Voivodeship	5	4
	Opole Voivodeship	1	4

Qualitative research is used to obtain data difficult to capture in a survey (e.g. the impact of the project on the professional and personal situation of participants), as well as to explore other topics that are important for evaluation (e.g. to focus on the project's weaknesses to be improved during the implementation of subsequent projects). It should be emphasized that quantitative research has some value in representativeness (i.e., the possibility of generalizing the results for the entire population) and the results of the data are presented in the report numerically (as a percentage or in absolute values).

Qualitative research cannot be statistically representative, but qualitatively obtained data can be considered "representative" in terms of the nature of the phenomena or effect being studied, thanks to the purposeful selection of a sample that takes into account the characteristics of the people interviewed. In our study, people from different training courses, from different provinces, with different professional and personal situations were selected for interviews.

PROJECT IMPLEMENTATION

638[2] women responded to the advertisement for participation in the project by filling out the recruitment form. **630** women eligible to participate in the project applied (including several dozen for more than one training and several for all trainings). The interest was very high.

A total of **358** women qualified for the project, and a total of **301** women (84%) completed the project and took the final test, of whom **291** improved their skills (81% of those who started the trainings and 97% of those who completed the trainings). In the rest of this chapter, we show data for N=358, unless otherwise noted.

The average age of the project participants is 34 – the youngest is 18, the oldest 58. 84% of the participants are from the Lower Silesian Voivodeship, and 16% from the Opole

[2] The number of people who registered for the project (some people registered for multiple courses and such multiple registrations were counted individually).

Voivodeship. More than half (61%) are residents of Wrocław, 6% – of other large cities (Opole, Wałbrzych), and every third participant (32%) lives in a smaller town or city.

Size of the town (number of inhabitants)	Number of participants	Percent
up to 10 thousand	69	19%
10-25 thousand	16	4%
25-100 thousand	31	9%
100-200 thousand (Opole, Wałbrzych)	23	6%
over 200 thousand (Wrocław)	218	61%
[no data available]	1	0%

The vast majority are with higher education (80%), 11% are post-primary school graduates, people in education (mainly students) constitute 8%, and 1% of participants - primary education.

More than half (59%) work. Among them, there are definitely more women employed full-time (44% in the entire group and 75% among employed) than part-time (15% and 25% respectively). The rest (41%) are not professionally active – they do not work, are not in education or not on maternity/parental leave.

The situation on the labor market	Number of participants	Percent
unemployed	104	29%
during studies - not working	30	8%
on maternity or parental leave	11	3%
works part-time (less than 160 hours per month)	53	15%
works full time (160 hours or more per month)	157	44%
[no data available]	3	1%

The professions and industries of the participants are very diverse (in the summary of the individual training below you can find brief characteristics of the participants).

Some of the participants are in a special situation, e.g., 6% are single mothers (22 people), 4% have a large family card (15 people), and 3% care for a disabled person (11 people). As many as 205 people (57%) declared that they were unable to pay for similar on their own.

We consider **disadvantaged people in a broad sense** to be women who meet at least one of the following conditions:

- are 50 years old or older,

- live in a town with fewer than 10,000 inhabitants,

- have primary education,

- are unemployed,

- are on maternity or parental leave,

- are in a special situation (are single mothers, have a large family card, take care of a disabled person), **excluding the answer "I am unable to pay for similar on my own"** (this criterion was excluded from the definition of a disadvantaged person due to the large number of indications, the subjective nature of this assessment and the lack of reference to a specific training price, the differentiation of prices and references to different topics of trainings).

Disadvantaged people in this broad sense constitute **58%** of all women who joined the trainings (209 out of 358 people).

For the purposes of the analyses, a woman who meets at least two of the above conditions at the same time was considered to be **disadvantaged in the narrow sense**, e.g. she is an unemployed single mother or lives in a town with fewer than 10 thousand inhabitants and at the same time, e.g. she takes care of a disabled person. This type of disadvantaged person (in the narrow sense) constitutes **20%** (72 out of 358 people).

Information about the project and motivation to participate

68% of people who submitted the recruitment form found out about the project from social media. This is confirmed by the results of the qualitative study – participants were not looking for a training (or if they were looking, they were generally interested in development opportunities, but not necessarily strictly in the area of digital competences). In this sense, it was a coincidence, but it was not a coincidence that this information was displayed to them – the subject of the training was in the field of their private and/or professional interests.

It appeared on Facebook. Interior design, 3D graphics – I search for something like that all the time, some information, so it seemed to have found me. [IDI 3D_1]

One of the women found out about the training at the employment office – not from a career's advisor, but from a poster. After seeing the information about the training, another participant had doubts whether the training was not just a pretext to extort personal data. Only after verification she decided to fill out the form.

The recruitment process itself was convenient and user-friendly – the form was clear, filling it out was not time-consuming. Many of the participants would be happy to apply for more than one training, but they understand that such a rule allows more people to benefit from the project.

The motivations for participating in the project were varied. Basically, they can be divided into professional and personal ones, however – as some participants emphasize – it is sometimes difficult to separate the private and professional aspects. Especially in professions related to IT and/or the creative and artistic industry – especially if you work

from home, remotely – it is difficult to find a precise boundary between work time and free, private time.

And basically, when I found this training, my first thought was personal development and using this knowledge for private purposes. However, the more I considered the possibilities, the more I saw the potential for developing my own business and possibly creating things that I could also use in my professional work. [IDI 2D_1]

Some people had specific expectations and plans for further professional development, others hoped that participating in the training would be the first step or inspiration for change.

I received funding from the employment office to buy an embroidery machine with basic equipment and a program for digitizing embroidery. I started my own business in July, but I lack the knowledge and experience to work smoothly in this area. I am interested in expanding my competences both in creating vector graphics (I have no experience) and using machines for digital fabrication (especially the embroidery machine). Classes on other machines will help me learn about other production methods so that I can implement them in my future work. I want to meet people who have experience in the industry and other potential entrepreneurs to exchange experiences. [application form]

Analyzing the data from interviews and forms, the following motivations for participating in the project can be distinguished:

- Professional development:
    - choosing a career path;

I am on a sabbatical. I am considering changing my major. I am looking for opportunities to gain new skills and broaden my horizons. I hope that taking a JavaScript programming training will help me choose my future career. [application form]

    - improving competences, e.g., learning a new device, program, programming language, tool, etc.;

I am a furniture designer, I run my own business as an interior designer and I do computer graphics (because I have a dual education and a dual career path). (...) So when I saw this 3D printing training, I thought it was perfect for me, that it would also complement my skills and I was always curious about it. And in addition, as a furniture designer, I deal with CAM software for preparing machines in the plant and that's how I thought it would also complement my professional skills. [IDI 3D_1]

    - better orientation in a narrow specialty;

I want to learn Python because it is one of the main languages of AI. Knowing the language I will better understand AI issues and find my way around them. In addition,

when implementing projects, I will be able to communicate with programmers more easily and understand them. [application form]

- formal confirmation of acquired skills (certificate);

To be honest, this diploma, certificate – the fact that everything is listed there (skills I have acquired) – is a kind of help for me during job interviews – that I know what I have, that I have completed . Because now employers want to see what you have done and they want to have a formal confirmation. (...) I have just finished interviews because I will be changing jobs in January (...) and I showed my diploma [certificate]. The gentleman was very interested that I have such skills and that I am also a person who improves my qualifications on my own. (...) And in this job where I am, a commission from a new client came (they are investigating the plant). I hung this certificate there, they looked and asked questions. Such a diploma increases the prestige of the employee and the entire company. [IDI 3D_1]

- a new offer from an organization, e.g., a non-governmental organization – based on new competences;

I want to expand the offer of the library where I work with a mobile application that will make it easier for students to check / gain knowledge along with presenting them with recommended readings on a given topic. [application form]

- change of industry, change of career path;

I want to learn 3D design for the purpose of changing my profession. I plan to start a career as a fashion designer and I will have to 3D print clothing elements - fasteners, buttons, plates for sleeve unrolling systems. [application form]

- escape from monotony and burnout,

In my current job I have reached a certain stage of stagnation, it is monotonous and repetitive work with Excel. I do not feel that I am developing, there is no possibility of a more ambitious approach to the next stage of development. I dream of starting a career in the IT department, getting to know deeply its structure, so that I can program projects that will speed up work and facilitate data analysis. [application form]

- remote work and employment flexibility;

I really want to learn a new, modern profession to be able to find a new job and increase my income. It is difficult to find a job in a small village, so it is important for me to master the work position to be able to work remotely. [application form]

- increasing attractiveness on the labour market and increasing employment opportunities;

I've been trying to find a job for a few months, without success. Many job ads require at least basic Python knowledge. Taking a training would allow me to improve my qualifications and have a better chance of finding a job. [application form]

  - returning to work, e.g., after maternity leave;

Returning from maternity leave to work part-time, I feel excluded and marginalized, and I would like to do something to counteract. Additionally, I have a strong need to learn so that my "pregnant" brain can get back into shape. [application form]

  - preparation for starting your own business.

Acquiring new skills will help me in the implementation of projects in the field of furniture renovation (printing for DIY needs, which is what I am currently doing), and ultimately the certificate of completion of the training will be an asset in obtaining funds to start my own business. [application form]

- Personal development:
  - development of creativity,
  - development of interests, hobbies, passions, e.g., handicraft, embroidery, sculpture;

I want to deepen my knowledge and spend time on something creative in a different way than before. I want to feel the joy of art and technology again without feeling guilty that it's just a hobby. [application form]

  - the possibility of creating something, "tangibility" (this was pointed out by the participants of the 2D training, but also by the Python training);

In my daily work I lack an element of creativity at DIY level. Working in Excel with numbers is my hobby, but the desire to do something artistic and practical at the same time, with my own hands, or with thoughtful clicks in the program, has been with me for years. I rarely make spontaneous decisions, and such a chance for self-development does not come often and I would like to squeeze as much as possible from this experience. I also care about something just for me, something that will very likely become my new passion. [application form]

  - proving to myself that I can do it;

It was a very big part of proving to myself that I can do things and that all those years of telling myself that I can't do it, have to be reset in a sense that yes, I can. If I want to, I can. [IDI IoT_1]

  - trying something new;

After studying the humanities, I feel the need to take care of this "stricter" part of my mind, which I also appreciate very much. I am simply curious about the world, I want to learn something new, take steps in a different direction than before. [application form]

  - the desire to develop and be a role model for others.

I am ending my employment contract in my current position, I want to change the industry due to burnout in my current position. I am also a mother of a wonderful daughter and I want to show her that there are always opportunities for change, you just have to be properly motivated :) [application form]

- Potential for the development of commercial (economic) activity – based on previous professional activity, but also on hobbies;

Designing utility items – especially dishes – is my greatest passion and I dream of making it my professional career in the future. After the , I would like to be more confident in 3D programs and create much more complex models, which I will later use to make glass and ceramic casting molds. [application form]

- Returning to past interests (private or professional);

I was interested in electronics and once, when I was learning it on my own (and it was a bit different with electronics back then), I couldn't do it because I was simply overwhelmed by various topics. However, electronics and these tools have always fascinated me, so these classes allowed me to return to this knowledge and finally spread my wings. [IDI IoT_2]

- Willingness to work with new technologies;

My motivation to participate in the series is based on a strong desire to creatively combine music and modern technologies. For many years, I have been professionally involved in music and music therapy, and at the same time I develop my artistic passions, such as painting and handicraft. Participating in the is a chance for me to expand these activities to include 3D design, which will open up new possibilities both in creating educational tools and in music therapy. I believe that this is the key to my further professional and artistic development. [application form]

- Keeping up to date;

I am interested in art and crafts in general, I am an art teacher also. Many years ago I made handmade cards and gifts, now it is just a hobby. I missed the moment when graphic design, plotters and cutters could enter my life. I see how many interesting and beautiful things are being created now, I would like to develop myself, learn something new, work with new materials and not stand still. [application form]

- “Reaching out to the people”;

I would like to have the opportunity to meet other women in a similar situation, changing career paths, looking for new challenges, and also "going out to people" after a long time spent on taking care of children. [application form]

- Classes for women only.

I had a moment when I started looking for various types of programming trainings and ROBISZ.TO probably popped up, and I signed up immediately – simply as soon as I saw information that it was possible and that it was for women in general, and I love such initiatives. When I started my own business, I also took part in such funding strictly for women and this cooperation between women is great and I really like this energy. [FGI]

Classes

In the stationary trainings, participants liked the combination of theory and practice, as well as the opportunity to use the equipment.

First we had an introduction, I would say, a bit theoretical, but there wasn't much of that theory and we also had access to computers at that time and we were already creating projects, which was definitely a plus for me. (...) And I really liked the fact that we didn't just get instructions on how to do something, we also learned how it works, why it works that way and what to do to make it work the way we wanted it to. And in the meantime we had the opportunity to use the equipment, so we could try out these projects tangibly, check them. And we had the opportunity to go through all of them, through every stage, through every process, through every piece of equipment. [IDI 2D_1]

The participants highly value the opportunity to prepare their own project – for some it was important to do something mainly for their own satisfaction, others wanted to prepare or expand a professional portfolio.

Researcher: I know that during the training each of you had to prepare a portfolio, i.e., your own project. Was this figurine or something else?

Training participant: There was more of it. Now I'm at my daughter's and she has it on her desk, but there was more of it, for example I also made jewelry there, I had a few of these things, my own [made]. And there was a photographer, she took a picture and I basically scanned my diploma right away, I put these pictures in and it went to LinkedIn, Facebook, I also bragged about it right away. The project and its presentation were useful thanks to these pictures. I actually go around all the time and show these figurines and see people's reactions. And everyone goes wow! And I think that in the future it will result in someone suddenly needing something, so they will contact me. [IDI 3D_1]

The topic of the portfolio was optional, and the participants were happy to take advantage of.

It was already the final project and everyone could freely choose either to design a simpler game, a website, a mini database. One woman was creating a dictionary, and another a virtual currency exchange office, so very small, basic things, but also nice. And my memory game was colorful, it was fun to click, I added different sounds there, so it was also nice. [IDI JS]

It was a big effort (especially for people from the Opole voivodeship) to get to the second part of the stationary trainings in Wrocław. An additional challenge was, for example, finding a replacement at work or having to take a leave. The intensity of the classes was also tiring - some participants took a day off after the weekend training meeting. Remote classes also required a lot of hours, but it was a bit easier to reconcile with private and professional life.

When I looked at the training schedule, it was just dense – twice a week for 4 hours and then Saturday for 7 hours, so it was a lot. I was afraid that I would just give up at some point, that I wouldn't be able to combine it all. But I managed. (...) I could even go on a three-day trip and just sit on the training [online] on Saturday, stay [on the trip] and work with the group. [FGI]

An unexpected difficulty was the flood in the region – some participants missed individual classes or even dropped out of the training because of it.

The preparations for this flood have worn me out, and I also missed one class again because I simply forgot about it. Yes, yes, I remembered, I really did remember, I wanted to, on Friday I was preparing for the classes, and on Saturday it was already known that we had to put up sandbags, and when I started putting up these sandbags, I realized at 6 p.m. that there was a training today. [IDI JS]

I know, that it clashed with one participant's studies and she was very sorry (but maybe she just went to a different date?), because she wanted to start the business by the 3D year, so she was keen on it. She only said that because of the flood the dates were changed. [IDI 3D_1]

The participants tried to cope with difficulties themselves, but they knew that they could always count on the instructors – during classes, during breaks, after class hours. Not all of them took advantage of this, but it was important to know that such a possibility existed. The awareness that during classes, but also after they ended, they were connected with other training participants and instructors on Discord (a communication tool) had a similar effect.

PROJECT RESULTS

A total of 358 women qualified for the project, and a total of 301 women (84%) completed it and took the final test, of which 291 improved their skills (which is 81% of those who started the trainings and 97% of those who completed the trainings).

In relation to 6 out of 7 indicators, the achieved results exceeded the target value of the indicator. Only 1 out of 7 indicators did not reach the target value - the IoT training enjoyed comparably less interest, and as a result, fewer women completed it and improved their skills.

Before the start of the training, more than half of the participants (63% of those who completed the training; N=301; which is 66% of those who improved their skills; N=291) had contact with at least one of the topics included in the main scope of the training. This means that in the project, a minority (37% of those starting the training) were complete beginners.

Indicator	Target value of the indicator (planned level of achieving results)	Indicator achievement (results achieved)
Number of women receiving support	348	358
Number of women trained to develop advanced digital skills[3]	245	291
Number of trained women who will develop advanced digital competences in the field of design, 3D graphics and additive technologies **(3D)**	78	83
Number of trained women who will develop advanced digital competences in the field of design, 2D graphics and CNC **(2D)**	48	57
Number of trained women who will develop advanced digital competences in programming and using AI tools in the design of IoT devices **(IoT)**	9	7
Number of women trained to develop advanced digital skills in JavaScript programming **(JS)**	55	62
Number of women trained to develop advanced digital skills in Python programming **(Python)**	55	82

[3] It was assumed that on average 70% of project participants would improve their digital competences. Verification was based on the evaluation of learning outcomes (ex-ante and ex-post evaluation) and a knowledge test.

Before the start of the project, the average knowledge score in the thematic scope of the trainings was **2**. After the end of the project, this self-assessment increased to **3.9**. The participants improved their knowledge by an average of 1.9 points. **88%** improved their knowledge thanks to participation in the project (N=301).

Before the start of the project, the average skill score in the thematic scope of the trainings was **1.5.** After the training, this self-assessment increased to **3.6**. The participants improved their skills by an average of 2.1 points. **94%** improved their skills thanks to participation in the training (N=301).

Before the project began, the average assessment of where and how to look for information on the topics covered by the trainings was **2.3**. After the training, this self-assessment increased to **4.3.** The participants' familiarity with sources of knowledge increased by an average of 2 points. **87%** improved their familiarity with sources of knowledge thanks to their participation in the project (N=301).

Disadvantaged people

The training was not completed by 16% of people who started it (N=358). Among people disadvantaged in the broad sense (meeting at least one criterion), 17% did not finish the training (N=209), and among people disadvantaged in the narrow sense (meeting at least two criteria), this percentage is 22% (N=72). Not all people who completed the training improved their competences. A total of 10 people did not improve their competences (knowledge, skills, or familiarity with sources of knowledge), which is 3% of all people who started it (N=358). 2 people among people disadvantaged in the broad sense (1%; N=209) did not improve their competences, while all people disadvantaged in the narrow sense who completed the training improved their competences (N=72). This can be interpreted that **disadvantaged people have greater difficulty completing the training compared to the rest of the participants, but if they manage to complete the training, they are more likely to improve their competences**.

In total, 44 people (15% of those who completed the training; N=301) after its completion stated that they had overestimated their time capabilities, and only 1 of them did not improve their competences. Among the broadly disadvantaged, 22 people overestimated their capabilities, which constitutes 11% of this subgroup (N=209). Among the narrowly disadvantaged, 3 people overestimated their capabilities, which constitutes 4% of this subgroup. This shows that the disadvantaged people assess their capabilities better than the rest of the participants.

Analyzing the percentages of subgroups distinguished by individual criteria of disadvantage, it can be seen that, compared to the entire population, the greatest differences concern the subgroup of women 50+. Compared to the entire population of project participants, proportionally fewer of the oldest women completed the training

and improved their competences. The percentages are slightly lower among caregivers of PWD than in the general population, although the differences are very small.

The opposite effect can theoretically be observed among people with the lowest level of education, however, due to the low number in the sample (1%, 3 people meeting the criterion) such a conclusion is not justified. A similar effect, although of a smaller strength, can be observed in relation to the people with large family card, although it is not visible in the case of single motherhood.

The greatest convergence of results in the subgroup with the results from the whole population occurs among people from small towns, unemployed and single mothers, which allows us to assume that these criteria - contrary to assumptions - do not negatively affect these two types of results (completion of the training and increase in competences) related to participation in the project.

Disadvantage criterion	**People who meet the criteria and started the training**	**Subgroup of people who completed the training**	**A subgroup of people who have improved their skills**
50 years old or older	4%	62%	54%
towns with fewer than 10,000 inhabitants	19%	81%	81%
unemployment	29%	83%	83%
maternity or parental leave	4%	85%	85%
primary education	1%	100%	100%
single mother	6%	86%	82%
large family card	5%	72%	72%
care for PWD	4%	79%	79%
Comparison – % for the entire population	**100%** (N=358)	**84%**	**81%**

SUMMARY OF TRAININGS

3D

TRAINING PARTICIPANTS

101 women qualified for the training, and during the 8 editions, a total of 86 of them completed it and took the final test. In the rest of the chapter, we show data for N=86, unless otherwise indicated. The average age of the participants is 34 – the youngest is 19, the oldest 56. 89% are from the Lower Silesian Voivodeship, 11% – of the Opole Voivodeship. The vast majority (72%) are residents of large cities, significantly fewer than people from smaller cities (between 25 and 200 thousand inhabitants) – 15% – and small towns (below 25 thousand inhabitants) – 12%.

Size of the town (number of inhabitants)	Number of participants	Percent
up to 10 thousand	7	8%
10-25 thousand	3	4%
25-100 thousand	5	6%
100-200 thousand (Opole, Wałbrzych)	8	9%
over 200 thousand (Wrocław)	62	72%
[no data available]	1	1%

The vast majority are with higher education (81%), 10% are post-primary school graduates, and 9% are people in education (mainly students).

More than half of the participants (61%) are professionally active, with more women working full-time (42% in the entire group and 69% among employed) than those working part-time (19% and 31% respectively). Professionally inactive people (who do not work, are not in education or not on maternity/parental leave) account for 37%.

The situation on the labor market	Number of participants	Percent
unemployed	21	25%
during studies - not working	9	11%
on maternity or parental leave	1	1%
works part-time (less than 160 hours per month)	16	19%
works full time (160 hours or more per month)	36	42%
[no data available]	2	2%

The professions and industries of the participants are very diverse - the most common professions are: computer graphic designer, teacher (educator/instructor), designer/constructor (e.g., furniture, clothing). Many professions require both digital skills (e.g., programmer, software tester, data analyst) and creativity (e.g., computer graphic designer, graphic designer, interior designer, 3D and special effects animator, architect and interior designer, visual artist, sculptor, photographer). Among the participants are some of administrative and office professions (secretary, local

government official, office worker, project coordinator) or service professions (waiter, hotelier, catering worker, masseuse, customer service specialist, salesperson, salesperson, helpline consultant). Several women also work in the financial and accounting industry (financial analyst, accountant) or production (production operator, furniture production technologist, biotechnologist - cosmetics production, chemist).

Some of the participants are in a special situation, e.g., they are single mothers (8 people), have a large family card (3 people) or take care of a disabled person (5 people). More than half of the group (49 people, 58%) declared that they were unable to pay for similar on their own.

PARTICIPATION IN THE TRAINING

Before starting the training, slightly more than half of the participants had some contact with spatial design (52%) or digital design other than spatial (53%). This means that almost half of the group were beginners.

Before starting the training, slightly less than half of the participants (47%) had no concerns about participating in the training, and 53% did. As many as 30 people were afraid that the level of the classes would be too high (and only 2 people - that it would be too low); 8 people - that there would be too little time; 2 people - that vector graphics was not for them.

After completing the training, 14 people overestimated their time possibilities; that the level of the classes was too high (4 people) or too low (1 person). For one of the participants, the problem was the lack of sufficient knowledge of English (especially since the program commands are in English and the instructors also use the English version of the programs).

TRAINING OUTCOMES

Indicators

Indicator	Target value of the indicator (planned level of achieving results)	Indicator achievement (results achieved)
Number of trained women who will develop advanced digital competences in the field of design, 3D graphics and additive technologies **(3D)**	78	83[4]

The achieved value of the indicator is 106% of the assumed (target) value. The indicator is equal to 83, because 83 out of 86 participants declared a higher self-assessment of

[4] The indicator value is based on the individual results of the participants.

knowledge or skills or familiarity with sources of knowledge after completing the training compared to the state before the training. (The remaining 3 people either did not improve their competences in any of the dimensions at all, or their self-assessment in the initial measurement was higher than in the second measurement, which may mean that thanks to participation in the training they became aware of deficits in knowledge and skills.)

86% of participants who completed the training (N=86), increased their knowledge, 94% their skills and 87% their familiarity with sources of knowledge. Taking into account people who did not complete the training (additional 15 people, N=101), the percentages of increase in competences for the initial group of participants are 73% for knowledge, 80% for skills and 84% for familiarity with sources of knowledge.

All participants who completed the training (86 people) passed the final test, which is an additional confirmation of the acquisition of digital competences in the field of design, 3D graphics and additive technologies.

Knowledge

Before the training, the average assessment of knowledge about what spatial design is for and where it is used was **2.5.** After the training, this self-assessment increased to **4**.

A comparison of the self-assessment of knowledge of individual participants shows that **86%** of them improved their knowledge of spatial design thanks to participation in the training: 3 people improved their assessment by 4 points (from 1 to 5), 9 people by 3 points (from 1 to 4 or from 2 to 5), 28 people by 2 points and 34 people by 1 point. (9 people did not change assessment of their knowledge after the training, and 3 people assessed their knowledge higher before the training than after the training, which may indicate that they became aware of knowledge deficits and are now able to estimate them more realistically). On average, they increased knowledge by 1.5 points.

The vast majority of participants who had contact with spatial design (82%) and with digital design other than spatial design (87%) increased their knowledge.

Skills

Before the training, the average assessment of spatial design skills and their use on digital machines was **1.7**. After the training, this self-assessment increased to **3.9**.

A comparison of the self-assessment of individual skills of the participants shows that **94%** improved their spatial design skills thanks to participation in the training: 9 people improved assessment by 4 points (from 1 to 5), 25 people by 3 points (from 1 to 4 or from 2 to 5), 33 people by 2 points and 14 people by 1 point. (Only 1 person did not change assessment of the skills after the training, and 4 people assessed their skills

higher before the training than after the training). On average, they improved skills by 2.2 points.

Almost all participants who had contact with spatial design (93%) and non-spatial digital design (96%) before the training improved their skills.

Sources of knowledge and further development

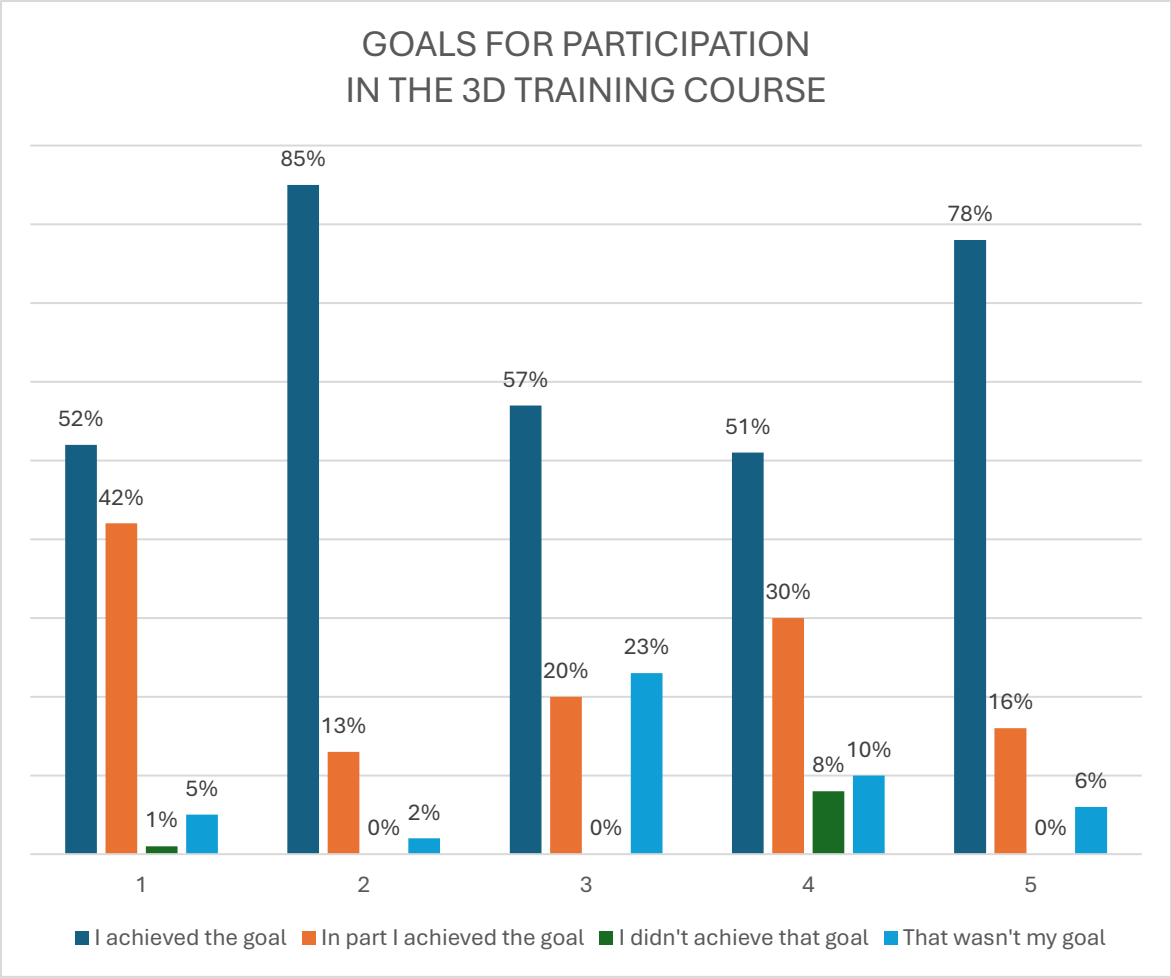
Before the training, the average assessment of where and how one can look for information about spatial planning and educating oneself was **2.4.** After the training, this self-assessment increased to **4.6**.

A comparison of the self-assessment of knowledge of individual participants shows that **87%** of them, thanks to participation in the training, improved their familiarity with sources of knowledge and of self-education: 5 people improved assessment by 4 points (from 1 to 5), 31 people by 3 points (from 1 to 4 or from 2 to 5), 34 people by 2 points and 5 people by 1 point. (9 people did not change assessment of their knowledge after the training, and 2 people assessed their knowledge higher before the training than after the training). Their familiarity with sources of knowledge increased by 2.2 points on average.

The vast majority of participants who had contact with spatial design before the training (84%) and had previously encountered non-spatial digital design (87%) increased their familiarity with sources of knowledge and independent.

Achieving training goals

The goals related to participation in the training were achieved – in whole or in part – by almost all or the vast majority of participants. The goal related to operating a 3D printer was achieved by 98% of people, the goal related to spatial design – by 94%, and 94% also achieved other personal goals. In terms of preparation for advanced training, this goal was achieved by a total of 77%, and 81% achieved the goal related to professional use of spatial design or digital machines.



Other outcomes

The interview participants liked the fact that the training allowed them to check how they felt about a given topic, e.g., one participant already knew that she would be working with Blender (she did not like Fusion 360 at all). Another one had already purchased a Fusion 360 training on the Udemy platform (she had not started it yet, but in the meantime, she had completed another training purchased earlier on the platform – on operating 3D printers). She appreciated that taking part in the evaluated training brought her closer to the topic of new technologies and the technological market. Thanks to this, she felt that she was more up to date, and that she was keeping up with the rapidly changing world. For her, the training was an opportunity to familiarize herself with devices such as a 3D printer and learn about the possibilities of using them to develop her interests (she creates ceramics, carnival costumes, props for fantasy sessions etc.). Not only does she intend to use the tools she has learned in handicrafts, she also plans to continue developing in this direction, and perhaps in the future this hobby will become her job.

I see it more as an alternative, or maybe a chance to change jobs in the future, to retrain, to develop something in a different field. I have more or less an outline of my plan, but I also must have the courage to do something on two tracks - it is very time-consuming,

because I can't quit your job without having some alternative, so I have to do it on two tracks, i.e. go to work, and in addition develop this passion and possibly enter the market with it. So develop passion yes, but not enter the market yet. I am at that stage. [IDI 3D_3]

Another participant treated the training as an opportunity to supplement her professional skills – she is a furniture designer, she also does interior design, architecture, and computer graphics – and the 3D training was ideal for this purpose. It met her expectations, and the added value was getting to know the Fusion program and slicers (for preparing g-code programs for machines), as well as the discovery that she feels good creating 3D objects and that she wants to do it the future. She plans to buy a 3D printer and a CNC milling machine.

It was such a self-knowledge, what I have in my heart, what is playing in my soul - that creating these objects, 3D characters is simply something very much for me and I should do everything in my life to develop it. I will continue this, I will go to other s, because I also want to learn how to use CAMs [Computer-Aided Manufacturing] and post-processors for CNC machines, so thanks to this training I have already marked out such a path for myself, what I want to do next and what I want to know. [IDI 3D_1]

She is very happy with the items she printed during the training (e.g., the dream figurine of her daughter, jewelry) and the positive reactions and interest from those around her. Perhaps this hobby will turn into an additional source of income.

So they're already asking me if I have a 3D printer, so I can start with something as a hobby. I'm still looking for a path, but there's some interest and I'll probably develop it. Businesses always start with some hobby, something that you get into. So I'm starting to think about how to use 3D printing. And in the meantime, I've done some upholstery workshops and I'm already designing a chair, so Blender will definitely be used to make elements on CNC for now, or maybe later I will make prototypes on a printer. So if I want to go in this direction, I have to come up with this business myself from A to Z and think it over and just take small steps to make it grow. [IDI 3D_1]

In addition, learning about the Tinkercad program on the training inspired her to expand her current activity to start 3D classes for children (she previously taught ceramics and handicrafts) – she has already contacted friends who are kindergarten owners.

Another participant was looking for a training that would allow her to gain basic knowledge so that she could later educate herself. She succeeded – she is not only able to use a given program or equipment, but also understands the principles of its operation. What's more, thanks to the training she understood in what direction she wants to continue developing and working on herself.

And I was also pleasantly surprised by the training that it showed me two paths of development for a person who models in 3D, that is, the parametric path (things related

to modeling in AutoCAD or Fusion) and the more artistic path (Blender, figurines, etc.). And I was very pleasantly surprised that I have preferences in exactly the opposite direction than I expected. That is, in these more parametric things. [IDI 3D_2]

She hoped that the training would help her find a job.

The training fulfilled its purpose, maybe not by directly helping me find a job, but it improved my well-being enough that it was easier for me to look for a job and to take advantage of the opportunities that appeared. It also had one very nice effect, because when I did the training I received instructions on how to do them, I did them, I saw that I was doing well and my self-esteem, which was down, very quickly started to jump higher and higher. Later I managed to get a job, I managed to do very well in job interviews and on the trial day. And at this moment I am very happy, because I have a new job, where I do more creative things, things that actually have an impact. [IDI 3D_2]

From today's perspective, she believes that perhaps taking a training on operating CNC machines (2D - Practical use of computer graphics in digital fabrication) would be more beneficial when looking for a job, but despite this, she does not regret choosing the 3D training. It gave her a lot of satisfaction, developed her creativity - she now has a lot of ideas. If she had a bigger apartment, she would buy a 3D printer (now she prepares files at home and prints them at a friend's).

The training gave her tools that she can use and that inspire her privately and professionally. Using Fusion, she has already prepared her first furniture project. Possible that she will set up a carpentry shop in the future - she will definitely want to do parametric modeling. She also met with great interest from her friends and positive reception that she was taking part in the 3D training, which was followed by offers for her to design or make something for them. During the interview, she showed a rich collection of objects that she had created during the training: board game tokens, a sword from The Witcher, a dice from the computer game Companion Cube, a rat skull, a brooch from a Scottish clan (for a theatrical character). She also printed out some things from the Internet, e.g., an RPG figurine, a Cerveza Cristal keychain (from Star Wars).

2D

TRAINING PARTICIPANTS

63 women qualified for the training, and during the 5 editions, a total of 59 of them completed it and took the final test. In the rest of the chapter, we show data for N=59, unless otherwise indicated. The average age of the participants is 34 years – the youngest is 21, the oldest 55. 73% are from the Lower Silesian Voivodeship, 27% – of the Opole Voivodeship. Almost half (46%) are residents of large cities, slightly fewer (44%) are people from small towns (less than 25 thousand inhabitants).

Size of the town (number of inhabitants)	Number of participants	Percent
up to 10 thousand	24	41%
10-25 thousand	2	3%
25-100 thousand	6	10%
100-200 thousand (Opole, Wałbrzych)	4	7%
over 200 thousand (Wrocław)	23	39%

The vast majority have higher education (75%), people in education (mainly students) constitute 13%, and 12% are graduates of secondary school.

More than half of the participants (56%) are not professionally active – they do not work, are not in education or not on maternity/parental leave. Among the employed, there are definitely more women working full-time (32% in the entire group and 74% among those employed) than those employed part-time (12% and 26% respectively).

The situation on the labor market	Number of participants	Percent
unemployed	22	37%
during studies - not working	9	15%
on maternity or parental leave	2	4%
works part-time (less than 160 hours per month)	7	12%
works full time (160 hours or more per month)	19	32%

The professions and industries of the participants are very diverse – from typical office or service positions (e.g. office manager, salesperson), through technical professions (e.g. engineer, food technologist, furniture designer) and related to IT (UI designer, computer scientist, computer graphic designer, tester), to artistic and creative (graphic designer, scenographer, fashion designer). Several women are professionally involved in education (teacher, pedagogue, speech therapist, librarian), business and management (project manager, marketing specialist, logistics, finance, and accounting), and also perform other types of work (e.g. optometrist, hairdresser, confectioner, farmer, production worker).

Some of the participants are in a special situation, e.g., they are single mothers (3 people), have a large family card (3 people) or take care of a disabled person (2 people). As many as 38 people (64%) declared that they were unable to pay for similar on their own.

PARTICIPATION IN THE TRAINING

Before starting the training, slightly more than half of the participants had some contact with vector design (53%) or digital design other than vector graphics (51%). This means that almost half of the group were beginners in this field.

Before starting the training, 46% of the participants had no concerns about taking part in the training, while 53% did. 20 people were afraid that the level of the classes would be

too high: 8 people - that the level of the classes would be too low; 7 people - that there would be too little time; 6 people - that vector graphics were too difficult; 2 people - that vector graphics were not for them. Individuals were afraid to be not creative enough or that due to the language barrier they would not be able to discuss such complex topics in detail with other participants.

After completing the training, only 5 people felt that they had overestimated their time capabilities; that the level of the classes was too high (4 people) or too low (3 people). For 2 people the training was too short, 1 person had a problem with too fast pace of the classes being and the high time pressure, which made it difficult to follow and take notes at the same time.

TRAINING OUTCOMES

Indicators

Indicator	Target value of the indicator (planned level of achieving results)	Indicator achievement (results achieved)
Number of trained women who will develop advanced digital competences in the field of design, 2D graphics and CNC **(2D)**	48	57[5]

The achieved value of the indicator is 119% of the assumed (target) value. The indicator is equal to 57, because 57 out of 59 participants after completing the training declared a higher self-assessment of knowledge or skills or familiarity with sources of knowledge compared to the state before the training. (The remaining 2 people in the initial measurement declaring the maximum possible assessment value repeated it in the second measurement, with one exception - one of the participants initially assessed her familiarity with sources of knowledge as 5, and then as 3, which means that thanks to participation in the training she became aware of previously unknown possibilities of searching for information and educating herself.)

85% of participants, who completed the training (N=59), increased their knowledge, 93% their skills and 88% their familiarity with sources of knowledge. Taking into account those who did not complete the training (additional 4 people, N=63), the percentages of competence gain for the initial group of participants are 81% for knowledge, 89% for skills and 84% for familiarity with sources of knowledge.

All participants who completed the training (59 people) passed the final test, which is an additional confirmation of the acquisition of digital competences in the field of design, 2D graphics and CNC.

[5] The indicator value is based on the individual results of the participants.

Knowledge

Before the training, the average assessment of knowledge on what vector graphics are for and in what cases they are used was **2.5**. After the training, this self-assessment increased to **4.2**.

A comparison of the self-assessment of knowledge of individual participants shows that **85%** of them, thanks to participation in the training, improved their knowledge of vector graphics and its application: 3 people improved assessment by 4 points (from 1 to 5), 16 people by 3 points (from 1 to 4 or from 2 to 5), 16 people by 2 points and 15 people by 1 point. (7 people did not change their assessment of their knowledge after the training, and 2 people assessed their knowledge higher before the training than after the training, which may indicate that they became aware of knowledge deficits and are now able to estimate them more realistically). On average, they increased their knowledge by 1.7 points.

More than half of the participants who had contact with vector design (60%) and digital design other than vector graphics (58%) before the training increased their knowledge.

Skills

Before the training, the average assessment of the ability to create vector graphics and their practical use was **1.9.** After the training, this self-assessment increased to **4.1**.

A comparison of the self-assessment of the skills of individual participants shows that **93%** of them improved their skills in creating and using vector graphics thanks to participation in the training: 8 people improved their assessment by 4 points (from a score of 1 to 5), 17 people by 3 points (from a score of 1 to 4 or from a score of 2 to 5), 16 people by 2 points and 14 people by 1 point. (Only 4 people did not change their assessment of their skills after the training). On average, they improved their skills by 2.2 points.

87% of participants who had contact with vector design before the training increased their skills, as did 90% of those who had previous experience with digital design other than vector graphics.

Sources of knowledge and further development

Before the training, the average rating of where and how to look for information about vector graphics and self-education was **2.5**. After the training, this self-assessment increased to **4.5.**

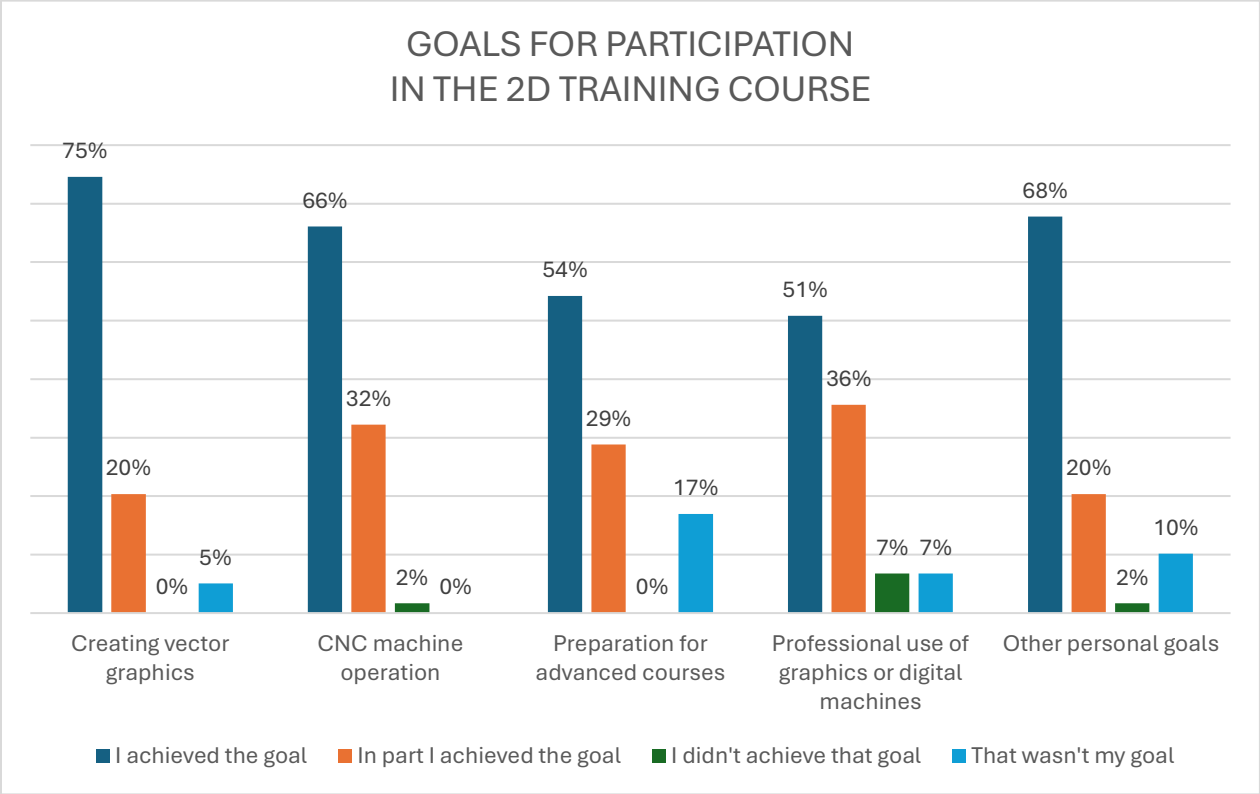
A comparison of the self-assessment of knowledge of individual participants shows that **88%** of them, thanks to participation in the training, improved their familiarity with

sources of knowledge and of self-education: 6 people improved their rating by 4 points (from 1 to 5), 20 people by 3 points (from 1 to 4 or from 2 to 5), 12 people by 2 points and 14 people by 1 point. (6 people did not change their assessment of their knowledge after the training, and 1 person rated their knowledge higher before the training than after the training). Their familiarity with sources of knowledge increased by 2 points on average.

More than half of the participants who had some contact with vector design before the training (56%) and 83% of those who had some contact with digital design other than vector graphics (58%) increased their familiarity with sources of knowledge and independent .

Achieving training goals

The goals related to participation in the training were achieved – in whole or in part – by almost all or the vast majority of participants. The goal related to creating vector graphics was achieved by as many as 95% of people, the goal related to operating CNC machines – by 98%, and 88% also achieved other personal goals. As for preparation for advanced trainings, this goal was achieved by a total of 83%, and 87% achieved the goal related to the professional use of graphics or digital machines.



Other outcomes

Participants in the qualitative study emphasize that taking part in the training gave them self-confidence, motivated to further development and allowed to gain orientation in a field in which they had no experience before. Thanks to this, they now know, for

example, which machines they work well on and which ones are less suitable for them. They also have an idea whether a given device can be useful to them for professional, commercial or hobby purposes.

One participant had classes using an embroidery machine at university (at that time she did not feel that she had learned the device well). When she went to the training, she wanted to assess whether it was worth investing in buying such a device and using it for income purposes in the future. Taking part in the training allowed her to gain insight and consider using the embroidery machine for a different purpose than she had planned before the training - for textile design (which is her hobby). Another person, influenced by the training, bought an iPad and uses it for designing (she had previously used a laptop).

Another participant plans to buy a laser plotter, which she wants to use both as a hobby and professionally. When she went on the training, she was focused primarily on acquiring and using skills for professional purposes, in optometry.

There are usually certain leading brands that produce certain things, and these are not always products that will work for specific patients, e.g. teaching aids that I use with a teenager or an adult will not necessarily work for a five-year-old, because they may be too difficult for them, too small, too visually complicated. Now, having these skills, I am able to create other aids that will be simpler or based on a slightly different principle or adapted to the needs of a specific patient. (...) I created such projects for the first time during breaks between classes and I have the opportunity to try them out - I can check with patients whether it will bring the results I expect. And if so, I consider expanding this line of activity in the future. [IDI 2D_1]

Her example shows that the knowledge and skills acquired during the training can be used in other specialist industries, in an unconventional way and with great added value for professional activity. Additionally, the classes inspired her to think that her hobby (handicraft) can also become a source of income. The purchase of a plotter will enable her to develop in two ways - in optometry and in handicraft. She is currently looking for funding for this purpose and hopes that she will be able to implement it in the first half of next year.

If it really ends up with the purchase of the device, it would involve expanding the scope of my activity and also changing it a bit, as if adding this handicraft part. (...) It would be a bit like dividing this career path into two parts - developing the branch related to manufacturing, handicraft, and a bit of a change of work [as an optometrist]. [IDI 2D_1]

Another participant runs an association and two day care centers for children and young people, and she signed up for the training primarily to be able to design posters, invitations, and information to post on Facebook and the website. Additionally, she wanted to expand the range of classes for children and include computer graphics and

classes where you can produce something (she had previously used a sublimation printer in her organization and knew it was a good idea, because it gave the children a lot of satisfaction). Her association also had a cutting plotter – she was able to operate it in a basic way, and thanks to participating in the training, these possibilities were significantly expanded. What's more, after the training (and after prior consultation with one of the instructors), she bought new machines and new software for the organisation – which she learned about during the training: a laser and a machine for cutting plywood or engraving. There are plans to make further purchases – including programs she learned about during the classes. The newly acquired equipment is already being used by children to create Christmas tree decorations.

We want that each child could take home at least one Christmas tree ornament, which they make together with me, and that it is again their work, which hangs on their Christmas tree, some thing created by this child. (...) This shows that this child has possibilities, that want to and can develop. And the child sees it: I did it! (...) They gain such self-confidence and if they managed here, they will manage in life. [IDI 2D_2]

It is also worth mentioning the benefits of stationary classes – being around people and sharing passions with them. New acquaintances allowed for the exchange of experiences and mutual inspiration during classes, and after their completion – continuing relationships in private or professional ways.

We all had the desire to create something, whether it was handicraft or various other forms of production, creation, hobby, all of that connected us. All of use were "make-up artists". And that was also fantastic, because specialist trainings usually bring together people who have a similar path, a similar educational path, a similar point of view. And here, even when we looked at our projects, which we made ourselves later, it was like: Oh wow! It didn't occur to me that something like that could be done. It was like a completely different perspective on using the same skills - and I think that's very, very positive. [IDI 2D_1]

IoT

TRAINING PARTICIPANTS

11 women qualified for the training, and 8 of them completed it and took the final test during one edition. In the rest of the chapter, we show data for N=8, unless otherwise indicated. The average age of the participants is 37.5 – the youngest is 26, the oldest 58. The majority are residents of Wrocław (6 people), the remaining 2 are from towns with a population of up to 10,000. Almost all of the participants have higher education, only 1 person is a graduate of a secondary school.

All of them are professionally active, 5 work full-time and 3 part-time. Some work in IT-related professions (e.g., software engineer, Content Specialist, programmer/coder/graphic designer, data engineer), the rest in other industries (gastronomy, real estate management, public administration, accounting). 5 are in a special situation - 4 are unable to pay for similar on their own, 1 has a large family card and is a carer for a person with a disability.

PARTICIPATION IN THE TRAINING

Before the training, only 1 person had any experience with creating IoT devices, 3 with designing microcontrollers, and 2 with creating programs in C++. The group was mostly beginners.

Before the training, 3 people had no concerns about participating in the training, while 5 did. 3 of them were afraid that the level of the classes would be too high, 1 that it would be too low, and 1 - that working with microcontrollers and digital tools was not for them. After completing the training, 1 person overestimated their time capabilities and that the level of the classes was too high, and 1 that it was too low.

TRAINING OUTCOMES

Indicators

Indicator	**Target value of the indicator (planned level of achieving results)**	**Indicator achievement (results achieved)**
Number of trained women who will develop advanced digital competences in programming and using AI tools in the design of IoT devices **(IoT)**	9	7[6]

The achieved value of the indicator is 78% of the assumed (target) value. The indicator is equal to 7 because 7 out of 8 participants after completing the training declared a higher self-assessment of knowledge or skills or familiarity with sources of knowledge compared to the state before the training. (1 person did not improve competences in two dimensions, and self-assessment of the ability to work with AI tools in the initial measurement was higher than in the second measurement, which may mean that thanks to participation in the training she became aware of deficits in skills).

88% of participants who completed the training (N=8), increased their knowledge, 75% their skills and 88% their familiarity with sources of knowledge. Taking into account people who did not complete the training (additional 3 people, N=11), the percentages

[6] The indicator value is based on the individual results of the participants.

of increase in competences for the initial group of participants are 63% for knowledge, 54% for skills and 63% for familiarity with sources of knowledge.

All participants who completed the training (8 people) passed the final test, which is an additional confirmation of the acquisition of digital competences in the field of programming and the use of AI tools in the design of IoT devices.

Knowledge

Before the training, the average assessment of knowledge about what microcontrollers are for and where they are used was **1.9**. After the training, this self-assessment increased to **4.3**.

A comparison of the self-assessment of knowledge of individual participants shows that 7 out of 8, thanks to participation in the training, improved knowledge of the use of microcontrollers: 1 person improved assessment by 4 points (from a score of 1 to 5), 4 people by 3 points (from a score of 1 to 4 or from a score of 2 to 5), 1 person by 2 points and 1 person by 1 point. (1 person, who before the training had contact with creating IoT devices, with designing microcontrollers and with creating programs in C++, did not change their assessment of their knowledge after the training). On average, they increased their knowledge by 2.4 points.

Skills

Before the training, the average assessment of the ability to work with AI tools was **2.2**. After the training, this self-assessment increased to **3.7**.

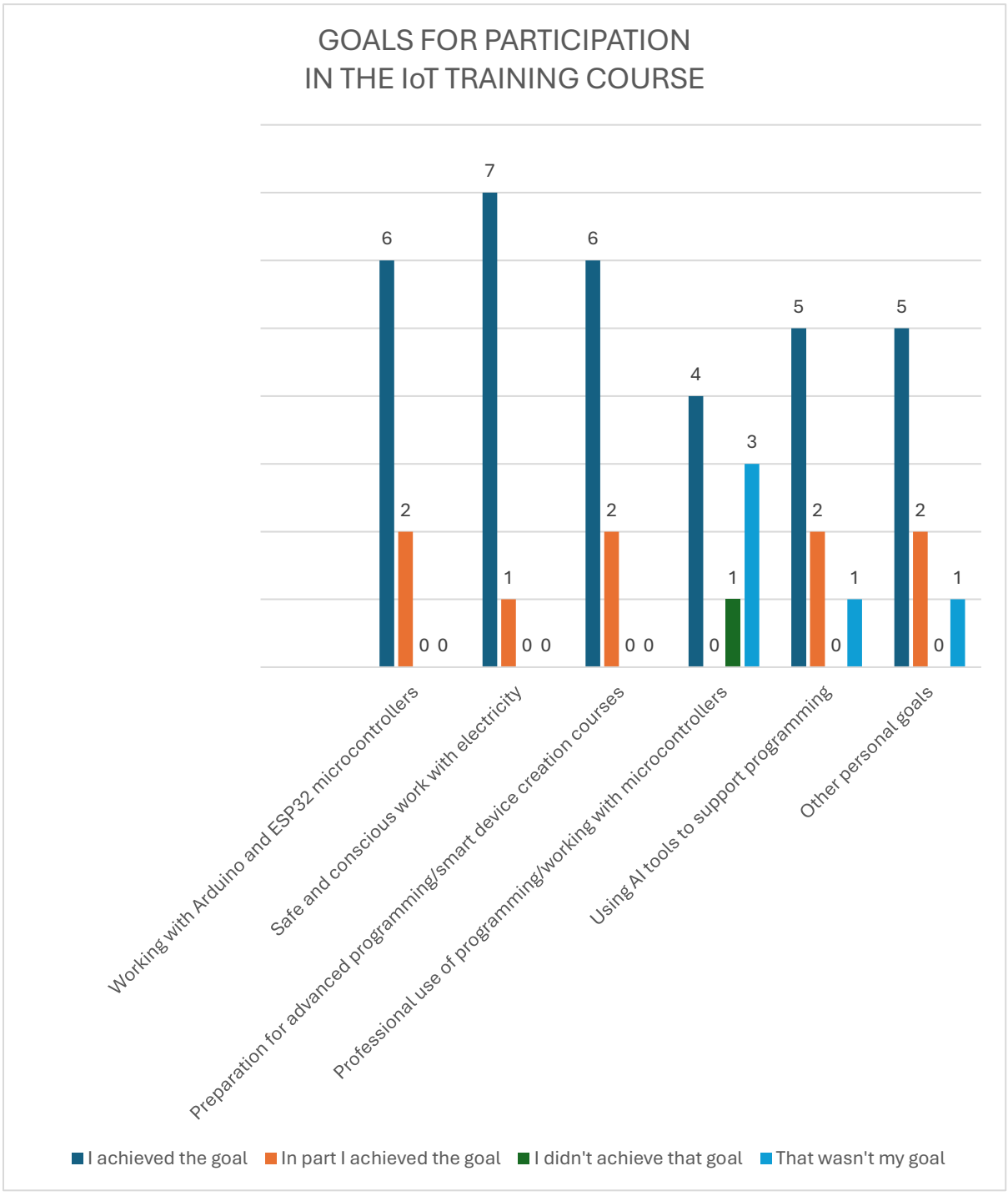
A comparison of the self-assessment of individual skills of the participants shows that 6 out of 8 improved their skills in working with AI tools thanks to participation in the training: 1 person improved their assessment by 4 points (from a score of 1 to 5), 1 person by 3 points (from a score of 2 to 5), 2 people by 2 points and 2 people by 1 point. (1 person, who had contact with microcontroller programming before the training, did not change their assessment of their skills after the training. On average, they improved their skills by 1.5 points. And 1 person, who had contact with creating IoT devices, designing microcontrollers and creating programs in C++, rated their skills higher before the training than after the training).

Sources of knowledge and further development

Before the training, the average rating of where and how to look for information about creating IoT devices and self-education was **1.7**. After the training, this self-assessment increased to **4.6.**

A comparison of the self-assessment of knowledge of individual participants shows that 7 out of 8 improved their familiarity with sources of knowledge and of self-education thanks to participation in the training: 3 people improved their rating by 4 points (from 1 to 5), 3 people by 3 points (from 1 to 4 or from 2 to 5) and 1 person by 2 points. (1 person who had contact with creating IoT devices, designing microcontrollers and creating programs in C++ did not change their knowledge rating after the training). Their familiarity with sources of knowledge increased by 2.9 points on average.

Achieving training goals



All participants achieved the goals related to working with Arduino and ESP32 controllers, safe and conscious work with electricity, preparation for advanced trainings in programming/ creating smart devices. The goals related to using AI tools to support programming and other personal goals were achieved by all participants who were interested in achieving them. Only in relation to the goal related to the professional use of programming/ working with microcontrollers, 1 person did not achieve this goal, and for 3 it was not a set goal.

Other outcomes

One of the participants of the qualitative study decided to take part in the training to cope with a difficult personal and professional situation (she has been on sick leave for several months after a difficult experience at work) and to improve her programming skills, which will help her find a new job. Another important motivation was the desire to free herself from low self-esteem, to do something in harmony with herself and to follow her interests.

I think the hardest thing is the leap from thinking that I'm too stupid (and besides, I'm a woman, so why am I going to mess around with some cables) to thinking that no, you're totally not too stupid, go mess around with cables. It'll be great. (...) And these classes had a big impact on my thinking. I can see a big difference – I stopped telling myself that I'm stupid. And that if I don't understand something at the beginning or that I have to go through something a few times, it's ok, it's totally fine, it's normal. Nobody is born with the information right away to build a hugely complicated cleaning robot. [IDI IoT_1]

Taking part in the classes allowed her to open up to new experiences, new knowledge, trying new things, making mistakes, and reaching out for help. All of this strengthened her greatly and she is optimistic about the future.

Even if I don't find a job in this field (which is very possible considering the current situation on IT job market), it's still very good for my head, in terms of self-confidence, development and doing things. (...) It's a kind of bag of skills, in which I collect things from this area, which will allow me (even if it's not specifically IoT) to develop further and it will definitely be useful. Such building of a base, potential, resources - without yet deciding that I will be a programmer, but even if I don't, I already have the basics that may be useful to me in something else. [IDI IoT_1]

What did she learn? The list is long: block programming in Tinkercad, basics of operation and programming in C++, using libraries, understanding microcontrollers, Arduino IDE, ESP 32 (https://wokwi.com/), IoT device management tool (https://thingsboard.io/) and much more.

How to connect things to things so that they don't burn, explode, or break. (...) Understanding how Arduino differs from ESP32, for example, and what the components and possibilities are. (...) I know how to build a 3D printer, which I plan to do myself. I

can check what components are needed, what software I need to get or add to it. (...) I know how a multimeter works (by the way, I bought my first multimeter just a few weeks ago). [IDI IoT_1]

In addition to her technical skills, she appreciates the fact that she has learned to motivate herself and work on her own. Now she works on her own projects, such as an alarm clock and a sensor in the mailbox. She also has ideas for further projects – the training gave her a lot of inspiration - she has also decided to return to activities she had given up – learning Web Development, HTML, CSS, JavaScript on the Coursera platform (https://www.coursera.org/).

These aren't advanced projects yet, but they're basically writing code to get used to writing code. [IDI IoT_1]

It was important that the training was held stationary, which allowed for socialization and meeting people with similar interests. Combined with the supportive attitude of educators it gave a great sense of security.

The fact that you have to get up and go somewhere is very good in terms of getting ready to function in any way. (...) But the contact with people, not sitting at home all the time and hiding behind a switched off camera, but actually having to force yourself and be there. This is also a bit of additional motivation, that I committed to something, that these are people who know what I look like and my name, so it would be good not to fail. [IDI IoT_1]

This is confirmed by the second participant – in her opinion, offline classes, among women interested in a niche topic, were conducive not only to gaining skills, but also to establishing contacts that will be fruitful in the future. In her case, this is already happening – she and a friend from the training signed up for a Python training together. The Whatsup group (they call it a support group) is still active, where participants exchange industry information, support, mobilize, and inspire.

Only now my friends, with whom we are in touch, bought these Arduino kits on Allegro from Black Friday offer and they develop these various things, because they have this foundation, this knowledge to do something cool. (...) And we also wondered whether we shouldn't make electronic plush toys (for example, so that they make cool faces, blink their eyes, etc.) or even dancing Santa Clauses for Christmas, etc. [IDI IoT_2]

The skills acquired during the training will be used professionally and privately – to create an online game and a robot, as well as, for example, when decorating a house for Christmas.

I am simply in love with the training, in the organization that ran it, and the instructors themselves. Not only did I use this 100%, but I also feel like I used it 300%. I am also writing a computer game that features a robot, and I dreamed of embodying this robot

and creating its physical form. Thanks to these classes, first of all, I managed to make the device, the robot. On the other hand, knowing that I needed mechanics or physical features of the robot's body, I also immediately grasped the topic of 3D printers, 3D printing, 3D design. [IDI IoT_2]

She has many ideas – completely new ones and developing her previous projects, e.g., she makes felt bags and plans to add proximity sensors or other electronic elements to them. The classes gave her self-confidence, made her feel more valuable and she is happy that she has gained new, unique knowledge.

JS

TRAINING PARTICIPANTS

90 women qualified for the training, and during the 3 editions, a total of 65 of them completed it and took the final test. In the rest of the chapter, we show data for N=65, unless otherwise indicated. The average age of the participants is 33 – the youngest is 18, the oldest 51. 78% are from the Lower Silesian Voivodeship, 22% – of the Opole Voivodeship. The vast majority (59%) are residents of large cities, significantly fewer than people from smaller cities (between 25 and 200 thousand inhabitants) – 33% – and small towns (below 25 thousand inhabitants) – 18%.

Size of the town (number of inhabitants)	Number of participants	Percent
up to 10 thousand	10	15%
10-25 thousand	2	3%
25-100 thousand	7	11%
100-200 thousand (Opole, Wałbrzych)	8	12%
over 200 thousand (Wrocław)	38	59%

The vast majority have higher education (85%), % are people in education (all students), 5% are post-primary school graduates, and 3% have primary education.

More than half of the participants (58%) are professionally active, with more women working full-time (43% in the entire group and 74% among those employed) than those working part-time (10% and 26% respectively). Professionally inactive people (who do not work, are not in education or not on maternity/parental leave) account for 42%.

The situation on the labor market	Number of participants	Percent
unemployed	22	34%
during studies - not working	4	6%
on maternity or parental leave	1	2%
works part-time (less than 160 hours per month)	10	15%
works full time (160 hours or more per month)	28	43%

The participants work in various professions – primarily creative (computer graphic designer, interior designer, architect), IT (programmer, data analyst, tester, IT specialist,

application development coordinator, Senior Test Lead) and educational (teacher, educator, pedagogue, coordinator). Several people perform office and administrative work (secretary, clerk), financial and accounting work, service work (trade, cosmetology, gastronomy), and also deal with marketing / e-commerce. Individuals work in other industries, e.g., medical, and pharmaceutical, construction, production, energy, automotive and publishing.

Some of the participants are in a special situation, e.g., they are single mothers (4 people), have a large family card (2 people) or take care of a disabled person (1 person). The majority (45 people, 70%) declared that they are unable to pay for similar on their own.

PARTICIPATION IN THE TRAINING

Before starting the training, a relatively large number of people had contact with HTML and/or CSS (40%), but only a few participants had contact with JavaScript (15%). 30% of people had contact with other programming languages.

Before starting the training, every third participant (33%) had no concerns about participating in the training, while 67% did. As many as 25 people were afraid that the level of the classes would be too high (and only 3 people - that it would be too low); 17 people - that programming was not for them; 15 people - that there would be too little time, 1 person - that their children would interfere during the classes.

After completing the training, 18 people decided that they had overestimated their time possibilities; that the level of the classes was too high (8 people) or too low (1 person). Several people shared other observations, e.g., they pointed out that the program was too intensive (in the case of absences or problems with understanding the material, it was difficult to catch up). A person who was afraid of disruptive children wrote that this fear was unfounded thanks to the fact that everything happened on time and that there were breaks during the classes.

TRAINING OUTCOMES

Indicators

Indicator	**Target value of the indicator (planned level of achieving results)**	**Indicator achievement (results achieved)**
Number of women trained to develop advanced digital skills in JavaScript programming **(JS)**	55	62[7]

[7] Wartość wskaźnika bazująca na jednostkowych wynikach uczestniczek.

The value achieved of the indicator is 113% of the assumed (target) value. The indicator is equal to 62, because 62 out of 65 participants declared a higher self-assessment of knowledge or skills or familiarity with sources of knowledge after completing the training compared to the state before the training. (The remaining 3 people either did not improve their competences in any of the dimensions at all, or their self-assessment in the initial measurement was higher than in the second measurement, which may mean that thanks to participation in the training they became aware of deficits in knowledge or skills.)

In the case of people who completed the training (N=65), 92% of participants increased their knowledge, 91% their skills and 86% their familiarity with sources of knowledge. Taking into account people who did not complete the training (additional 25 people, N=90), the percentages of increase in competences for the initial group of participants are 67% for knowledge, 65% for skills and 62% for familiarity with sources of knowledge.

All participants who completed the training (65 people) passed the final test, which is an additional confirmation of the acquisition of digital competences in the field of design, 3D graphics and additive technologies.

Knowledge

Before the training, the average assessment of knowledge on how to create a web application was **1.4.** After the training, this self-assessment increased to **3.4**.

A comparison of the self-assessment of knowledge of individual participants shows that **92%** of them improved their knowledge of creating web applications thanks to participation in the training: 1 person improved their assessment by 4 points (from a score of 1 to 5), 20 people by 3 points (from a score of 1 to 4 or from a score of 2 to 5), 26 people by 2 points and 13 people by 1 point. (4 people did not change their assessment of their knowledge after the training). On average, they increased their knowledge by 2 points.

All participants who had contact with JavaScript before the training increased their knowledge, 87% of those who had previously contact with HTML and/or CSS, and 85% of those who had contact with other programming languages.

Skills

Before the training, the average assessment of web design skills was **1.3**. After the training, this self-assessment increased to **3.3**.

A comparison of the self-assessment of individual skills of the participants shows that **91%** improved their web design skills thanks to participation in the training: 4 people improved their assessment by 4 points (from a score of 1 to 5), 16 people by 3 points

(from a score of 1 to 4), 27 people by 2 points and 12 people by 1 point. (6 people did not change their assessment of their skills after the training). On average, they improved their skills by 2 points.

Almost all participants who had contact with JavaScript before the training (90%), 83% who had previously contact with HTML and/or CSS and 80% of those who had contact with other programming languages improved their skills.

Sources of knowledge and further development

Before the training, the average assessment of where and how to look for information about spatial planning and self-education was **2.1**. After the training, this self-assessment increased to **4.1.**

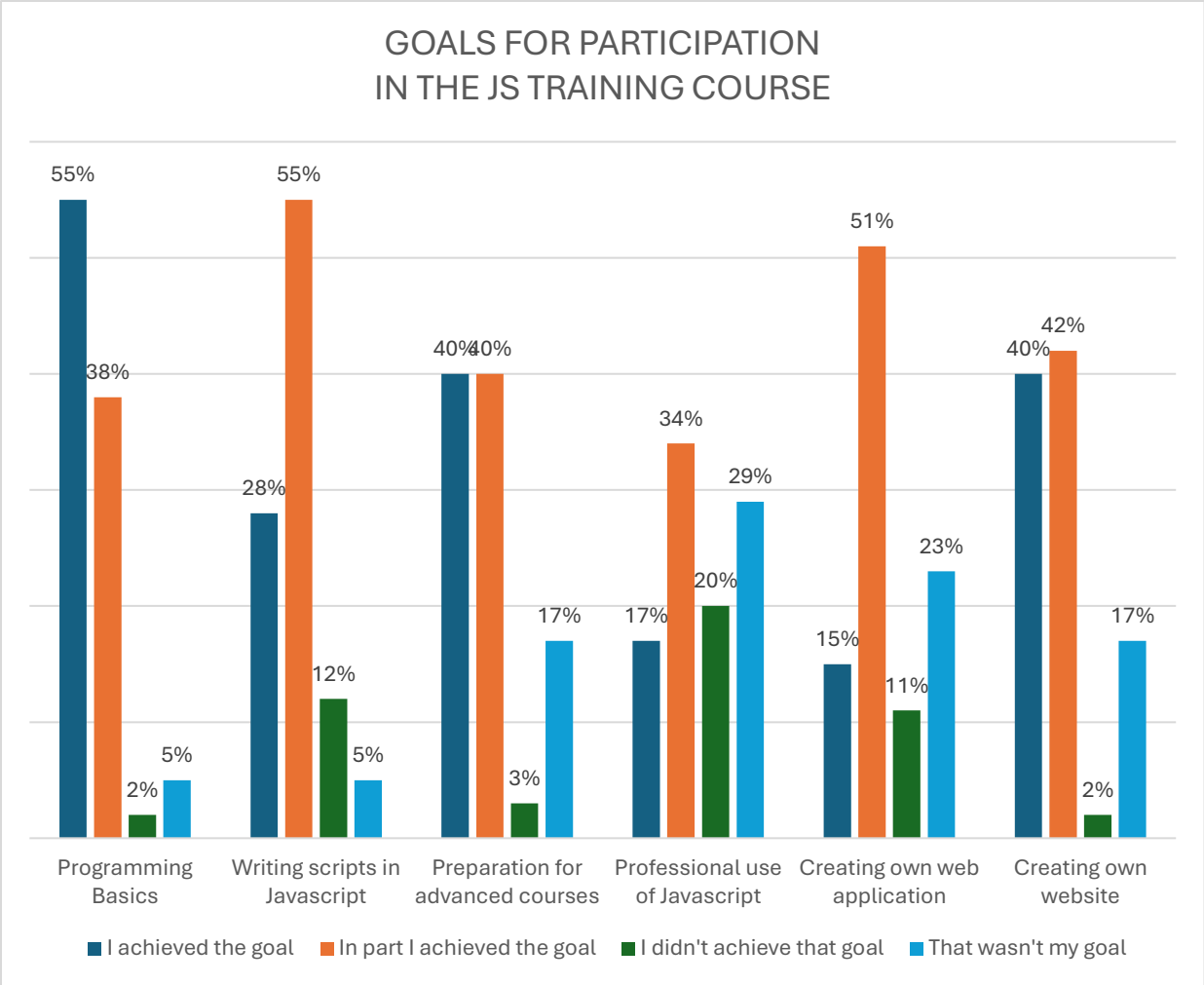
A comparison of the self-assessment of knowledge of individual participants shows that 86% of them improved their familiarity with sources of knowledge and of self-education thanks to participation in the training: 8 people improved their assessment by 4 points (from 1 to 5), 19 people by 3 points (from 1 to 4 or from 2 to 5), 12 people by 2 points and 17 people by 1 point. (7 people did not change their assessment of their knowledge after the training, and 2 people assessed their knowledge higher before the training than after the training). Their knowledge of information sources increased by 2 points on average.

Almost all participants who had some contact with JavaScript before the training (90%), 87% of those who had some contact with HTML and/or CSS before, and 70% of those who had some contact with other programming languages increased their familiarity with sources of knowledge and of self-education.

Achieving training goals

Some of the training-related goals were achieved – in whole or in part – by almost all or a vast majority of participants: the goal of learning the basics of programming – as many as 94% of people, the goal of learning to write scripts in JavaScript – 83%, the goal of creating your own website – 82%, and the goal of preparing for advanced trainings – 80%.

The goal related to professional use of JavaScript was achieved by a total of 51%, 20% did not achieve it, and 29% did not set it as their goal. The goal of creating your own web application was achieved by a total of 66%, 11% did not achieve it, and for 23% it was not their set goal.



Other outcomes

For the participants of the qualitative study, a significant advantage of the training was the opportunity to check whether creating websites and programming is a suitable job for them. Both interviewees found their place in programming and want to develop in this direction.

I am more interested in it than I was before the training. I am looking for more opportunities for self-development in programming, where previously my area of interest was mainly focused on creating websites. And now I am interested in programming itself. It has broadened my horizons so much. (...) It is nice to have such a background in programming and to learn it, even for myself, because I have also seen various beautiful visualizations of nature written in JavaScript, where as an artist I really like it and I also think it could be useful to me. I am very interested in it, even if I were not to use it in my work someday, I simply want to learn it and I think it is cool. [IDI JS]

One of them missed the first class and had to catch up. She learned a lot that way because she followed up on things she hadn't found in the class materials and looked for information on her own.

Certainly, in Java (and not in JavaScript) there are slightly different records of this data (there was WART, here it was LED), different definitions of the same data types. (...) Variables, floating-point - I found that myself. System outprint line, which was probably in Java, and we operated on JavaScript, so simply these examples that we had worked through, I was also looking for similar ones in Java. [IDI JS]

And the opportunity to create her own website with a memory game during the training and the satisfaction of seeing such a website working was very empowering and motivating.

I was making a memory game. Of training, later I tried to finish it, and I still haven't finished it, but I have it in the back of my mind and I think I'll do it. But it's cool, because later I added sounds to the page and it worked, I could modify the buttons, I tried to refine it so that it looked the way I wanted and that's why I learned a lot during that time, so it's definitely cool that you can do it on your own and check the effect, how it will work in reality and you can see it right away. [IDI JS]

She already had experience with programming, but she got really into it. She found information about the training while thinking about changing jobs – she still works in her previous job, but she is educating herself and her career path is increasingly connected to programming.

I had some experience with computer graphics at university because I graduated from the Faculty of Arts, so yes, I'm more interested in these topics than others. And I also wanted to learn how to design websites, so that I could do it on my own. So, then I also thought about developing myself and being able to work, maybe look for a job in a different direction, and not just after graduating from the Faculty of Arts. (...) And now I'm also continuing to learn JavaScript programming through the Khan Academy website, and other websites. I don't feel confident enough to start a new job, but I'm also creating my first websites for my portfolio. [IDI JS]

The classes captivated her so much that she signed up for a PHP training while the classes were still ongoing and is now using the Khan Academy offer (https://www.khanacademy.org/).

As I learned and became interested in it, I saw that programming itself is very interesting and very prospective for self-development. You can do a lot with it, so this curiosity fueled curiosity and finally at the end of this training... Now I'm still learning through free websites (free training), but I'm getting ready to buy a Java training (a basic one) and learn a full programming language, a bigger, more serious one. [IDI JS]

For the second participant, the training was a contact with a new topic, learning at the time of looking for a job, so completing the training was proof that if she is committed and consistent, she can learn something new and succeed in it. Thanks to the new

skills, she knows what she wants to do - work as a UX designer and looks to the future with great optimism.

I am still at the stage of looking for a job (as I was on the training), but now, preparing for this new [professional] start, I have new skills and going down this path, all these three things, three [programming] languages that I learned, I think I will be able to use. Because I think a bit about this UX designer and all these three languages [JavaScript, HTML, CSS] definitely open up this path. [FGI]

Both of them really appreciate the opportunity to ask questions and consult with the instructor during classes. This was important not only for substantive reasons, but also as a challenge that required overcoming, especially during classes conducted online.

I admit that despite the fact that there were only women, there were still many advanced girls there and at times I simply did not say anything. Despite the fact that I did not know anything, I could not speak up. I know that if we could see each other - each other's faces, reactions, I would have seen that I was not the only one who was green and scared of the pace, it would have been easier to react. However, this was my big difficulty when working online. (...) It was really mega valuable to say: Stop, I just can't - despite the fact that inside I was simply ashamed (you know how it is) and it was better to keep quiet (I'll read it myself). Breaking through and saying "I don't know" is also a great experience [FGI].

Python

TRAINING PARTICIPANTS

93 women qualified for the training, and during the 3 editions, a total of 83 of them completed it and took the final test. In the rest of the chapter, we show data for N=83, unless otherwise indicated. The average age of the participants is 33 years old – the youngest is 23, the oldest 48. 95% are from the Lower Silesian Voivodeship, 5% – of the Opole Voivodeship. The vast majority (67%) are residents of Wrocław, with approximately the same number (17%) of people from smaller cities (between 25 and 200 thousand inhabitants) as from small towns (below 25 thousand inhabitants) – 16%.

Size of the town (number of inhabitants)	Number of participants	Percent
up to 10 thousand	13	16%
10-25 thousand	5	6%
25-100 thousand	8	10%
100-200 thousand (Opole)	1	1%
over 200 thousand (Wrocław)	56	67%
[no data available]		

The vast majority have higher education (86%), female graduates of secondary school constitute 7%, 6% are people in education, 1% have primary education.

The majority of participants (65%) are professionally active, with more women working full-time (57% in the whole group and 87% among those employed) than those working part-time (8% and 13% respectively). Professionally inactive people (who do not work, are not in education or not on maternity/parental leave) constitute 35%.

The situation on the labor market	Number of participants	Percent
unemployed	21	25%
during studies - not working	4	5%
on maternity or parental leave	4	5%
works part-time (less than 160 hours per month)	7	8%
works full time (160 hours or more per month)	47	57%

The professions and industries of the participants are quite diverse. The group includes quite a few financial and banking positions, IT-related positions (e.g., Power BI Developer, junior front-end developer, local IT, software tester, application tester, CAD Designer) and administrative and office positions. Several people work in science or education (e.g. scientist, German teacher, educational consultant), in the broadly understood creative industry (e.g. furniture and sculpture design, jewelry designer - jeweler, interior designer, sale and production of polymer clay jewelry) and service industry (e.g. customer service, event industry, service coordinator, technical support consultant, gastronomy and hotel industry), as well as production (e.g. carpentry company, production and sale of lighting, steel structures). Individual people work as, for example, electrical engineer, anthropologist, librarian, computer graphic artist, laboratory diagnostician or digitization specialist.

Some of the participants are in a special situation, e.g., they are single mothers (4 people), have a large family card (4 people) or take care of a disabled person (2 people). The majority (56 people, 67%) declared that they were unable to pay for similar on their own.

PARTICIPATION IN THE TRAINING

Before starting the training, one in three participants had some contact with Python (35%), and almost half had previously come into contact with another programming language (49%).

Before starting the training, one in three participants (32%) had no concerns about taking part in the training, while 67% did. As many as 30 people were afraid that the level of the classes would be too high, 18 people - that programming was not for them; 11 people - that there would be too little time, and 9 people - that the level of the classes would be too low. Individuals were afraid that the classes would be too difficult, the pace - too fast, and they were also worried that their computer was too weak.

After completing the training, 20 people decided that they had overestimated their time capabilities; that the level of the classes was too high (6 people) or too low (1 person). For several people, the problem was the differentiation of the level of knowledge in the group, for two - the intensity and fast pace of the classes.

TRAINING OUTCOMES

Indicators

Indicator	Target value of the indicator (planned level of achieving results)	Indicator achievement (results achieved)
Number of women trained to develop advanced digital skills in Python programming **(Python)**	55	82[8]

The value achieved of the indicator is 149% of the assumed (target) value. The indicator is equal to 82, because 82 out of 83 participants declared a higher self-assessment of knowledge or skills or familiarity with sources of knowledge after completing the training compared to the state before the training. (1 person did not improve competence in any of the dimensions).

89% of participants who completed the training (N=83), increased their knowledge, 98% their skills and 87% their familiarity with sources of knowledge. Taking into account people who did not complete the training (additional 10 people, N=93), the percentages of increase in competences for the initial group of participants are 80% for knowledge, 87% for skills and 77% for familiarity with sources of knowledge.

All participants who completed the training (83 people) passed the final test, which is an additional confirmation of the acquisition of digital competences in the field of Python programming.

Knowledge

Before the training, the average assessment of knowledge about what Python is for and in what cases it is used was **1.9**. After the training, this self-assessment increased to **3.8.**

A comparison of the self-assessment of knowledge of individual participants shows that **89%** of them improved their knowledge of spatial design thanks to participation in the training: 5 people improved their assessment by 4 points (from 1 to 5), 25 people by 3 points (from 1 to 4 or from 2 to 5), 28 people by 2 points and 16 people by 1 point. (4 people did not change their assessment of their knowledge after the training, and 5

[8] The indicator value is based on the individual results of the participants.

people assessed their knowledge higher before the training than after the training, which may indicate that they became aware of knowledge deficits and are now able to estimate them more realistically). On average, they increased their knowledge by 1.9 points.

The vast majority of participants who had contact with Python (79%) and another programming language (88%) before the training increased their knowledge.

Skills

Before the training, the average rating of Python programming skills was **1.1**. After the training, this self-assessment increased to **3.3**.

A comparison of the self-assessment of individual skills of the participants shows that **98%** of them improved their Python programming skills thanks to participation in the training: 4 people improved their rating by 4 points (from a rating of 1 to 5), 27 people by 3 points (from a rating of 1 to 4), 33 people by 2 points and 17 people by 1 point. (Only 2 people did not change their rating of their skills after the training). On average, they improved their skills by 2.2 points.

Almost all participants who had contact with Python (93%) and another programming language (98%) before the training improved their skills.

Sources of knowledge and further development

Before training, the average rating of where and how to find information about Python and self-education was **2.4**. After training, this self-assessment increased to **4.2**.

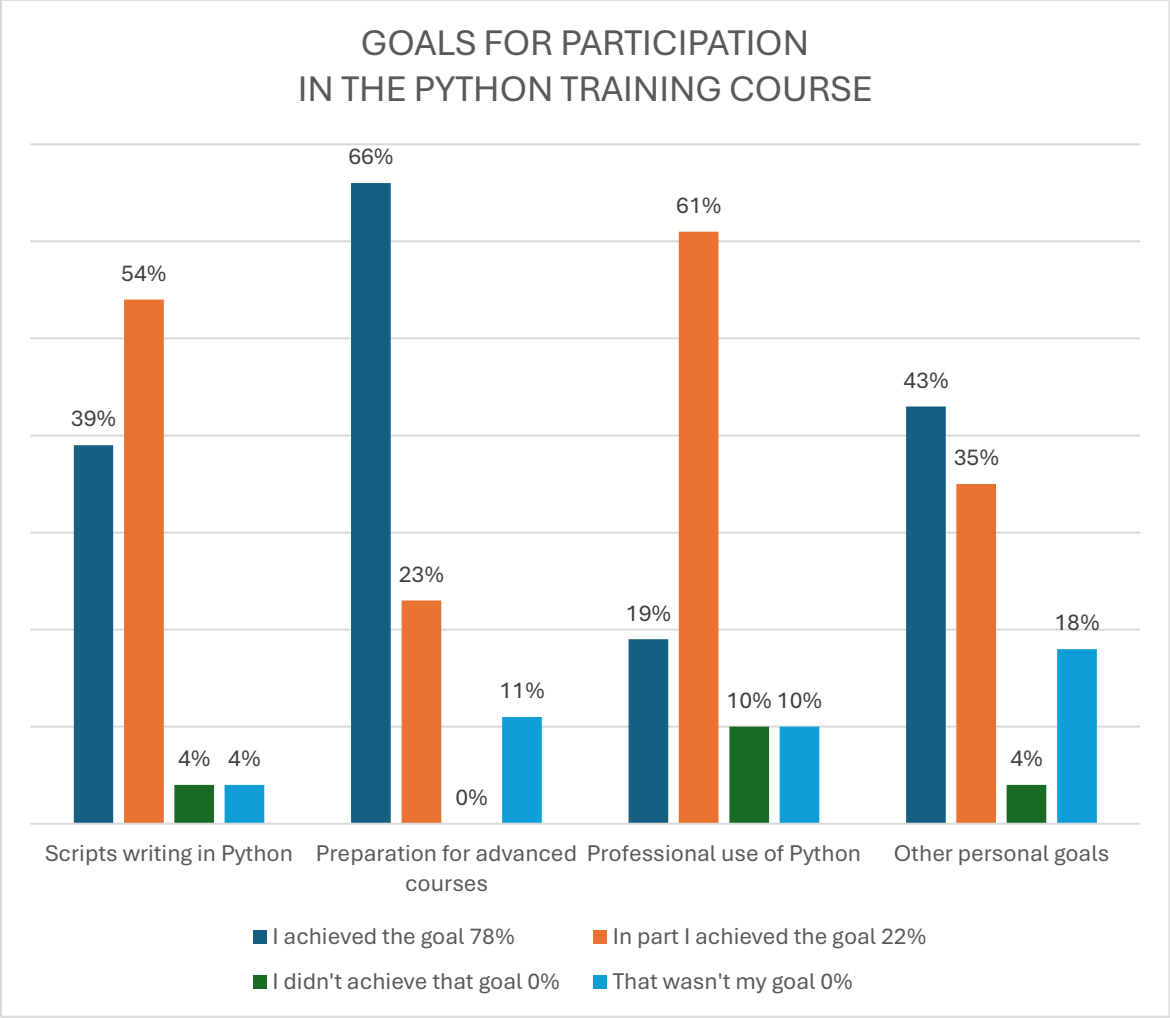
A comparison of the self-assessment of knowledge of individual participants shows that **87%** of them, thanks to participation in the training, improved their familiarity with sources of knowledge and self-education: 6 people improved their rating by 4 points (from 1 to 5), 18 people by 3 points (from 1 to 4 or from 2 to 5), 27 people by 2 points and 22 people by 1 point. (12 people did not change their assessment of their knowledge after the training). Their familiarity with sources of knowledge increased by an average of 1.8 points.

The vast majority of participants who had contact with Python (90%) and another programming language (88%) before the training increased their familiarity with sources of knowledge and self-education.

Achieving training goals

The training goals were achieved – in whole or in part – by almost all or the vast majority of participants. The goal related to learning the basics of programming was achieved by

all participants, the goal related to writing Python scripts was achieved by 93%, and 89% also achieved the goal of preparing for advanced programming trainings. As for using Python at work, a total of 80% achieved it, and 78% achieved other personal goals.



Other outcomes

Three participants of this training took part in the group interview (FGI). One of them had nothing to do with programming before – she designs jewelry on a daily basis, and she chose the Python training to try something new and see how she felt about it.

I was wondering what to do and this idea of programming came to me, because I have a few friends who do it and they say that it's a great space and thanks to the fact that it was a free training, I could even come into contact with this topic and check whether it's for me and whether I feel like it at all. (...) I'm more of an artistic soul, but there's also so much space for inventing, for designing, that I find myself in it. [FGI]

It turned out that she really liked Python and wanted to develop in this direction – although she had no such plans when she started the training.

For me, the most important information is that it didn't scare me as much as I had thought it would. I know that I have a lot of work ahead of me, but I'm determined, and I really want it - and that's because I was on this training for sure. I will take further steps in the subject, so I'm very grateful for this opportunity. [FGI]

The second participant works as a Front Developer and chose this class to expand her professional portfolio. She improved her skills, and considers learning about different Python applications and libraries to be the most important. She does not plan to change jobs for now, but she hopes that she will soon be able to use these skills professionally to a greater extent.

When I get out of this technology, meaning that when I get back on my feet so that I don't have to sit in it "after work" but "at work", I hope to write some application where the back end will be in Python, and I'll color the front [end] nicely. I'd like to, but the question is whether the time will be enough to do so. [FGI]

She is glad that she learned a new programming language, which helps her learn more such languages in the future.

A moment after this training, my employer asked me: Hey, do you know this technology? I said no. And he said: You'll learn quickly. And I did learn quickly – thanks to the fact that in the meantime I attended this Python training and that I already had experience learning a completely different language than JavaScript, so this third programming language really came easily to me. [FGI]

The third is an application tester and wanted to learn Python because several projects in her work use this language. She set a business goal for herself and managed to achieve it. And completing the Python training is her bargaining chip for negotiating with her employer on the subject of further improvement in this area.

My professional effect is that I am trying to force the company to guarantee me an advanced Python training – since I have already taken up the subject, let it end with full success. (...) Maybe the company will provide me with this advanced training – in business terms I would like to go a step further to consolidate it and actually use it at work. (...) I think I will not stop at Python if I master it freely enough to program something. I would also like to create my own application that I could display, or a website, or maybe a desktop application, or something for drawing. (...) Maybe a game for children or something – that would be cool. In any case, I would like to play with it, and I also want to use it professionally and expand programming skills with other languages – to be more attractive on the job market. [FGI]

For all of them, it was important that the training was only for women – although each of them sees different benefits. For one, it encouraged them to decide to participate and sign up for the training. Another appreciated the fact that during the work in online groups (in rooms) it was possible to talk, support each other or just be together in a

relaxed atmosphere. Those participants who had previously worked in this industry (although they have only been in it for a short time) felt more independent and more empowered as "women in IT" thanks to the training – for example in relationships with people from work or with their own husbands, who are also colleagues in the industry.

It helped our relationship in that he no longer knew Python, he doesn't know the language I write in now - like it or not I can no longer turn to him for help. And it also gave me a bit of a sense that I am or becoming independent and I am a valuable employee on the job market - without the help of my husband. So this is also something that I owe to the training. [FGI]

CONSLUSION

In the evaluation survey, project participants were asked whether they would recommend the program to a friend - asking for an answer using a scale where one means "I would definitely not recommend it" and 10 means "I would definitely recommend it". Almost all of them would definitely recommend it to others - the average is 9.6.

They were also asked to describe in their own words the one most important thing they learned during the program. Most of the answers are examples of specific knowledge or skills, e.g., operating a 3D printer, basic HTML and CSS, Python logic and syntax. Many participants emphasize that they stopped being afraid of a given topic (e.g., programming, operating devices), that new skills give them satisfaction, that they know where to look for information and to educate themselves. Participation in the training also taught them conscientiousness, patience, perseverance, not giving up, learning from mistakes, trying, and not being discouraged by failures. Below we quote selected answers to this question in full:

- *AI is not something to be afraid of, you just have to learn how to use it skillfully, because it can help a lot even during 3D modeling. And that 3D printing is not a "rocket science" skill and I can create in the comfort of my home, already having the basics and direction indicated where to look.*
- *I am incredibly fascinated by how pleasant the laser plotter is to use and how easy it is to create vector graphics. I used to struggle a lot with vectors, and I am very, very, very grateful that I was able to learn about them on a training in such wonderfully nice group of people.*
- *If something can't be done in a program, move on to the next program. It is important to approach printouts with patience and calm; the print can always be repeated.*
- *Don't give up, even if the task sounds like "in Chinese", because it is very easy to find a solution and create something out of nothing.*

- *Courage, stepping outside of comfort zones, looking for answers, asking for help and advice, cooperating.*
- *It was a wonderful adventure that showed me that the world is full of opportunities that I had not discovered. All you have to do is step outside your world a little and discover at least a dozen more. A wonderful experience. Thank you.*
- *Programming is no longer an inaccessible secret :) And it's easier and more enjoyable than I thought.*
- *I procrastinated with vector graphics and finally realized that I could do it. Now I am "in the process" and I intend to continue with both design and machines.*
- *Considering my lack of knowledge from before the class, I now feel almost like a hacker woman.*
- *I was fascinated by creating on the screen, not with a brush, but with code, and the possibility of improving and perfecting it - the artistic side of programming.*
- *That programming is not black magic, and you don't have to be a math major to figure it out. All you need is conscientiousness and the ability to think logically and you can really start creating your own programs.*
- *That can be for me too! And you don't have to be a genius to write even a short code that gives some effect and always pleases. Additionally, I worked hard on my discipline. Spending 4 hours in relative concentration 2-3 times a week learning something new is a challenge :)*

The last question in the ex-post survey was: Is there anything else you would like to tell us? The word "Thank you" is used more than 70 times in responses. The project participants thanked the opportunity to take part in the training, for the atmosphere, for the usefulness of the classes, and the high quality of content. Many of the thanks were directed to the instructors (for their professionalism, patience, approach, etc.) and to the association team. Some people made recommendations, e.g. extending the training duration, more homework, the possibility of using printers outside of classes, more time for individual work under the supervision of instructors or the possibility of one-to-one consultations, giving up group work in rooms, an additional supplementary or advanced training, an edition of the program addressed to men only, a different schedule of classes (e.g. 2 instead of 3 times a week), tutorials introducing the basics before the start of the training. Many people wrote that they would be happy to take part in another training course in the project or similar initiatives of the ROBISZ.TO association - also paid ones. Below we quote selected answers to this question in full:

- *I am very happy that I came across your training. It is a quantum leap for me.*
- *It was great, I will miss these classes on Thursdays and Fridays.*

- *Thanks for the cool, innovative formula for conducting the training - it wasn't clichéd, it was interesting and humorous, and on top of that a lot of ease, which is good for creativity!*
- *It's great that there is a platform and materials available on Discord. It's great that even after the training ends it will be possible to contact you. I've done a lot of different training in my life, but this was the best and most useful I've ever done. The whole training is a huge dose of knowledge given very efficiently and accessibly. I would like to thank everyone involved in creating this training :)*
- *Overall, I'm very positively surprised, motivated, a bit tired, but I just want to get into it! Thanks for the initiative!*
- *You are super and I felt very safe. Thank you so much in the world!*
- *It was really nice to gain knowledge in theory and practice from such well-rounded leaders who knew the answer to almost every question, and for those that didn't leave us but searched for a solution together. It felt like we had support and were working with people who knew what they were doing. Thank you :)*
- *I work at a school, so the classes solved a big, stressful problem for me, because now I have the skills and knowledge to conduct 3D printing classes for my students.*
- *A perfectly prepared training course, the right instructor in the right place! I joined the with pleasure, without stress :) A nice addition was sharing experience and examples from the life of a programmer ;)*
- *The knowledge provided during the classes was vast, but also presented in a very graphic and practical way, thanks to which I, as a layman and a person who knew nothing about 3D printing, became almost an expert in these 6 days of classes, who creates 3D models and operates 3D printers without any major problems.*
- *I gained a lot from interactions with other participants, when they helped me and I helped them - then I could assimilate and consolidate knowledge.*
- *Overall, I am delighted, you are great at what you do! I would like to meet you again at some.*
- *On my part, I would like to thank you very much for the opportunity and for choosing me to take part in the project. These 6 days showed me that design is something I want to do. The classes went by very quickly, the amount of knowledge provided was simply enormous (sometimes dizzying). I learned that FDM printing is definitely my direction, I met a lot of great people. (...) I hope that these were not my last workshops with Robisz.To! :)*
- *I wish the entire ROBISZ.TO team would have more such interesting trainings and development in the future :)*