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DiSTT

Joint Survey Report

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Joint Survey Report

DiSTT - Digital Skills Transformation Toolkit for a Resilient Labour Market, CE0200661

10 | 2024

Content

A. Introduction

This report summarizes insights from surveys conducted across all project partner organizations to assess digital fabrication skills, interests, and training needs among diverse groups, including high school students, apprentices, SMEs, and individuals from less privileged backgrounds. Each survey targeted unique demographics, revealing shared challenges like skill gaps in advanced manufacturing technologies and essential soft skills, as well as common preferences for practical, flexible training formats. Barriers such as time, cost, and accessibility were prominent, underscoring the need for adaptable, hybrid learning programs. Together, these findings will guide the design of tailored upskilling initiatives to enhance employability and digital competencies across the participant groups.

The survey methodology was primarily based on utilizing the internal resources of individual project partners, with external agencies engaged only occasionally. Respondents were approached mainly through structured questionnaires, which were slightly modified for each country to account for specific regional contexts. However, core categories (type of respondent, experience level with digital manufacturing, desired and needed skills and form of the support) were included in all versions of the questionnaire, ensuring consistency and comparability of results. Additional data and deeper insights into responses were gathered through individual interviews, allowing for a more comprehensive understanding of the specific needs and attitudes of respondents.

1. LP1 - BUT

The survey took place from September 30 to October 14, 2024, targeting students of the Faculty of Mechanical Engineering via an anonymous online questionnaire. A total of 139 students participated, of whom 109 were undergraduates and 30 were master's students. 14% of all respondents were woman.

The survey results in each of the following chapters are divided into two sections: one representing undergraduate students and the other representing master's students. The findings aim to highlight any potential differences in skills as well as expectations regarding digital manufacturing between these two groups.

2. PP2 - FL Brno

The survey was designed to gather feedback from FabLab Brno educational program participants, focusing on their skills, interests, and preferences for digital fabrication training. It aimed to identify existing skill gaps and gather insights on preferred learning formats and barriers to participation. The survey was conducted internally by the project team, as part of ongoing research into developing relevant upskilling and reskilling programs for young people and other target groups. Participants were from high schools with technical and humanitarian backgrounds to cover all possible answers. The total number of respondents is 129.

3. PP3 - HappyLab

We conducted the survey in collaboration with our two main partners, "Jugend am Werk" and "Wiener Linien", who distributed it mainly to their apprentices in October 2024. This is reflected in the responses. The survey was carried out using the recommended tool, Microsoft Forms, which was translated into German to enhance accessibility. In total, we received 82 responses.

4. PP4 – Brigk

For the survey we decided to try an alternative approach then an online only questionnaire. This was based on the following considerations:

The target group of SMEs is not very responsive to online surveys. Our stakeholders stated that in the past only about 5 % of sent requests to other surveys got even an answer. Further the quality of the answers was not fully reliable, as the actual source within the company is not traceable and the taken time points to a superficial editing.

To get hold of that, we decided to go into personal interviews. This was split into conservations with company owners and/or managing directors and employees of the same companies. This approach should show the estimated future needs from a strategical point of view and bring up existing potentials for digital fabrication skills among the employees. Both can so be a legit base to build best suitable contents for the upcoming phase of planning workshops on those topics.

The process of getting in contact with persons in charge at companies turned out very time consuming. This was accompanied by a lot of telephone and video calls, personal contacting at suitable events and exchange with the stakeholders. Last but not least, the form of personal interviews takes it time.

All of that led to a smaller number of responses then wished. Latest number is 29 out of 8 companies.

Nevertheless, the quality of the answers is high, due to the fact, that in the process of talking beside the questionnaire, hidden processes, actions and needs could be identified. This wouldn't have happened otherwise. The results are pointing out similar needs so far. These are also supported by off record conversation at events that were attended to make contacts.

As a base for the survey, the jointly created questionnaire was taken and slightly modified. For the employers, questions on the dependency on the automotive sector and local economy where added. Further the soft skill questions were modified to be more specific.

The split of the targeted persons results into two data sets, that are comparable in the main parts.

5. PP5 - NOI

For the survey part of the project, we used the planned budget and conducted a thorough and comprehensive survey with the support of professionals. After comparing some offers, we commissioned the study from a local professional firm called Apollis (https://apollis.it/). The entire setup and construction of the survey were done in close collaboration with these experts, interacting also with local stakeholders (the survey was strongly and explicitly supported by the three local partners of DiSTT: Wirtschaftsverband für Handwerker und Dienstleister (lvh.apa); Südtiroler Handwerksverband (SHV) Deutsche Bildungsdirektion Südtirol) and the DiSTT project partners.

This study, conducted by Helmuth Pörnbacher and Elena Vanzo, explores the current state, needs, and employee qualifications related to digital production technologies in South Tyrol. The aim is to understand how these technologies are being used and what support businesses need to adopt them effectively.

The definition of these parameters, from the type of company to the number of employees, passing through the questions of the questionnaire, the forms of support, the list of skills... has been at the center of reflections and discussions to arrive at a framework considered more effective from different points of view

The study was structured to cover several key areas:

- The current situation of digital production technologies in businesses.
- General preferences for support.

- The actual use of these technologies.
- Interest in receiving support.
- Specific support measures that could be implemented.

Research Questions:

- The study seeks to answer several important questions:
- Which technological fields and specific technologies are relevant to businesses?
- Which technologies are currently being used?
- Where is there a need for support?
- What forms of support are most suitable for businesses?

Methodology and Implementation:

The study targets manufacturing businesses with at least 8 employees, registered with the Chamber of Commerce in Bolzano. The methodology includes contacting businesses by phone, identifying the appropriate contact person (such as production managers or technical directors), explaining the study's goals, and sending an invitation email with a link to a standardized questionnaire. The economic activities of the participating businesses and their employees were sourced from ASTAT 2021. This data provides a comprehensive overview of the business landscape in South Tyrol. Statistics on businesses registered with the Chamber of Commerce in Bolzano are categorized by employment size. This helps in understanding the distribution of businesses based on their size and economic activity.

6. PP6 - FabLab Zagreb

The survey was designed to gather insights from participants with less privileged backgrounds. It aimed to assess their current skills, interests, and learning preferences to identify potential gaps and understand the most effective training formats for this demographic. Conducted internally by the project team, the survey is part of a broader initiative to develop accessible upskilling programs that can empower participants with digital skills, thus enhancing their career prospects.

Despite these efforts, gathering responses proved challenging, as some institutions associated with this target group do not permit external surveys, limiting our ability to reach a broader base of participants. The total number of respondents is 57.

B. Type of respondents

1. LP1 - BUT

All the respondents are 18 to 25 years old. They are full-time students at Faculty of Mechanical Engineering Brno University.

Bachelor's students

34% of bachelor's students answered that they have no experience with a job yet, while 66% of bachelor's have or had some job (summer/holiday job, voluntary work, temp. job). Of those who already had or currently have a job, 43% work manually, 33% work as operator of some hardware (or machine) and 53% work with software (office work). 15% of those working students have or had a job in digital manufacturing.

Master's degree students

Only 10% of master's students answered that they already have no experience with a job, while 90% of bachelor's have or had some job (summer/holiday job, voluntary work, temp. job). Of those who already had or currently have a job, 26% work manually, 33% work as operator of some hardware (or machine) and 89% work with software (office work). 30% of those working students have or had a job in digital manufacturing.

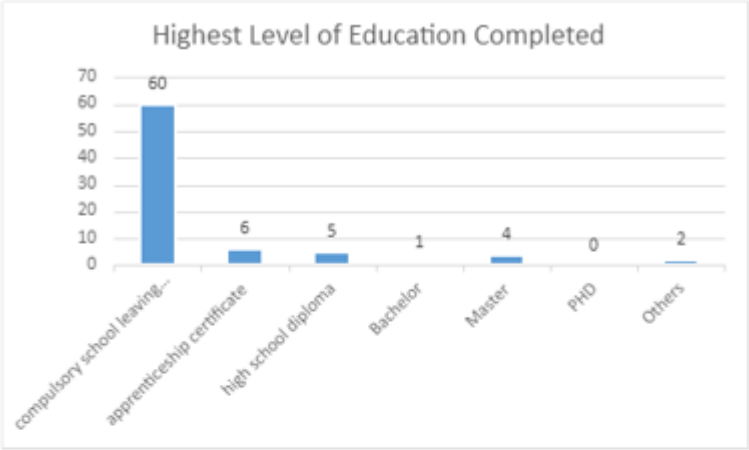
2. PP2 - FL Brno

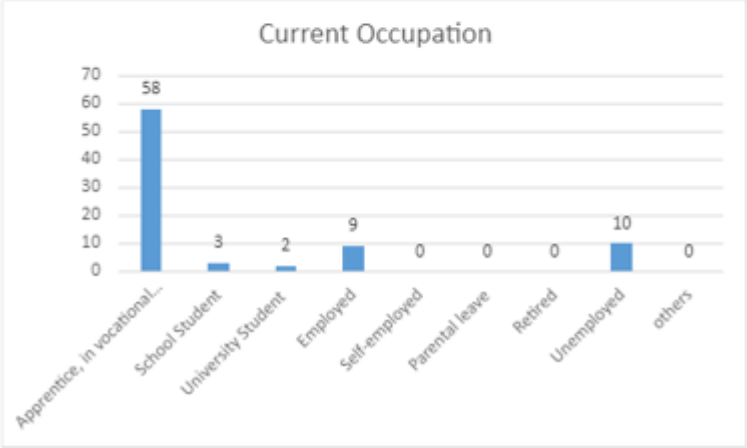
This target group, consisting of high school students about to enter the labour market, represents a crucial demographic for developing digital fabrication skills. They are at a formative stage in their education and career development, where gaining the right skills can significantly influence their employability and future career paths.

From a demographic point of view, 109 respondents are under the age of 18. Another 20 respondents are in the 18-25 age group. Thanks to the cross-section of schools approached, there are 69 men and 61 women among the respondents, the rest did not state their gender. The maximum education level of most respondents is primary school and they are currently high school students.

3. PP3 - HappyLab

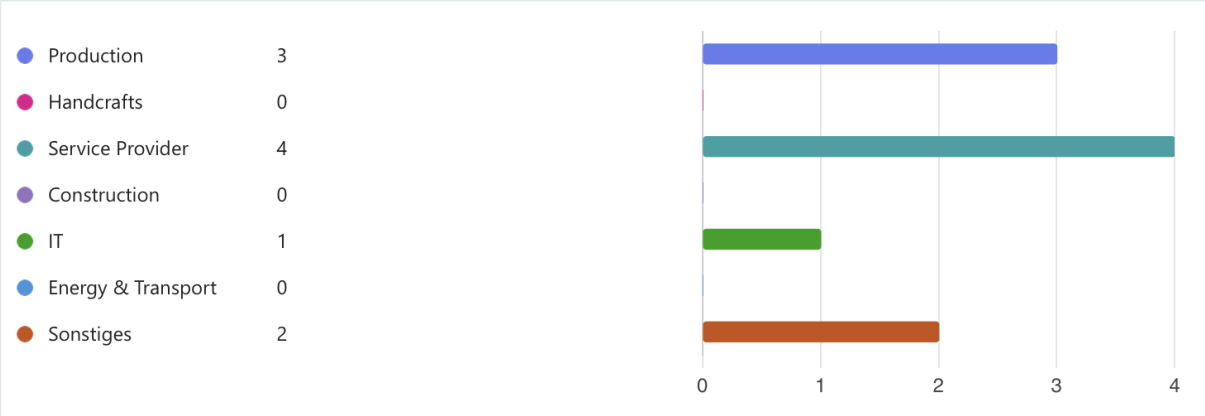
From 82 responses 28 were under 18, 45 were between 18-25, 3 were between 26-45, 2 were between 46-55 and 2 over 56. From 82 responses 54 identify as male, 26 as female, and 2 as non-binary. Since the main audience for the surrey were apprentices and they are still in training the biggest group regarding the education levels is to be found with a compulsory school leaving certificate.





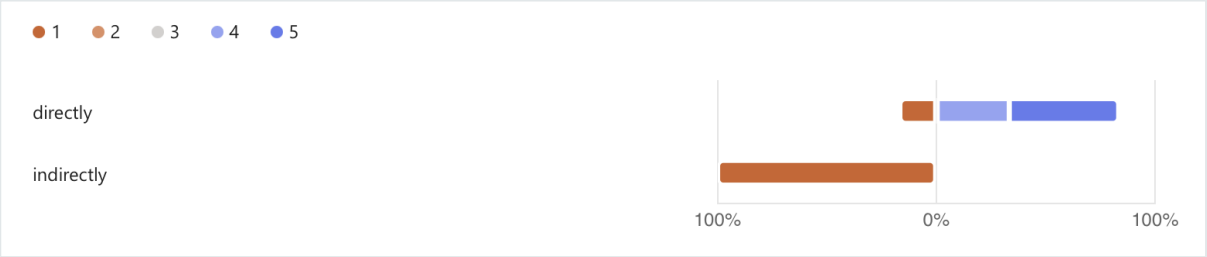
4. PP4 - Brigk

The surveyed companies are active in different fields.

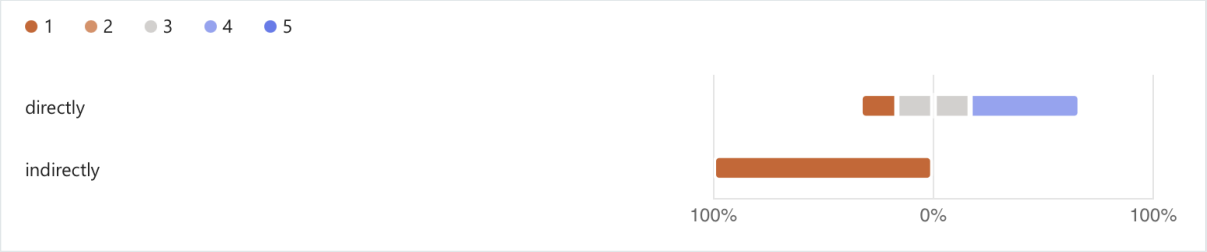


Production is for the automotive industry only. But also, service providers are mainly provided with orders by it.

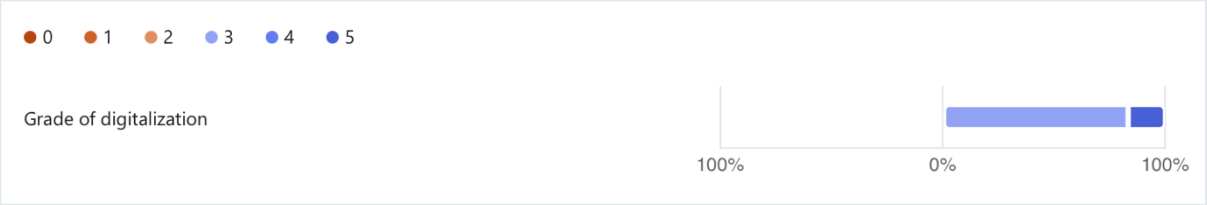
This reflects also in the question of the dependency on the automotive industry.

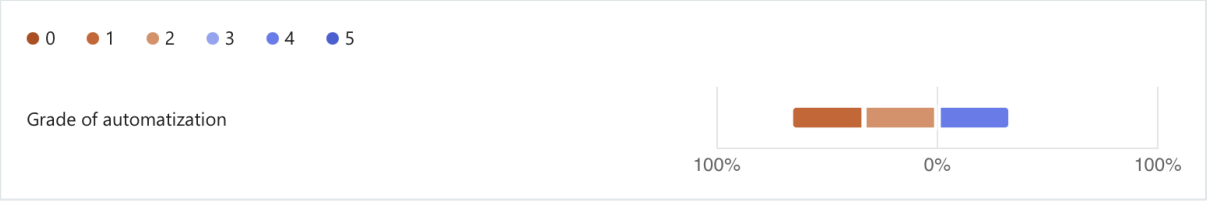


The dependency on the local economy is also high.



The responsible persons assess their companies' level of digitalization and automation as high in average.





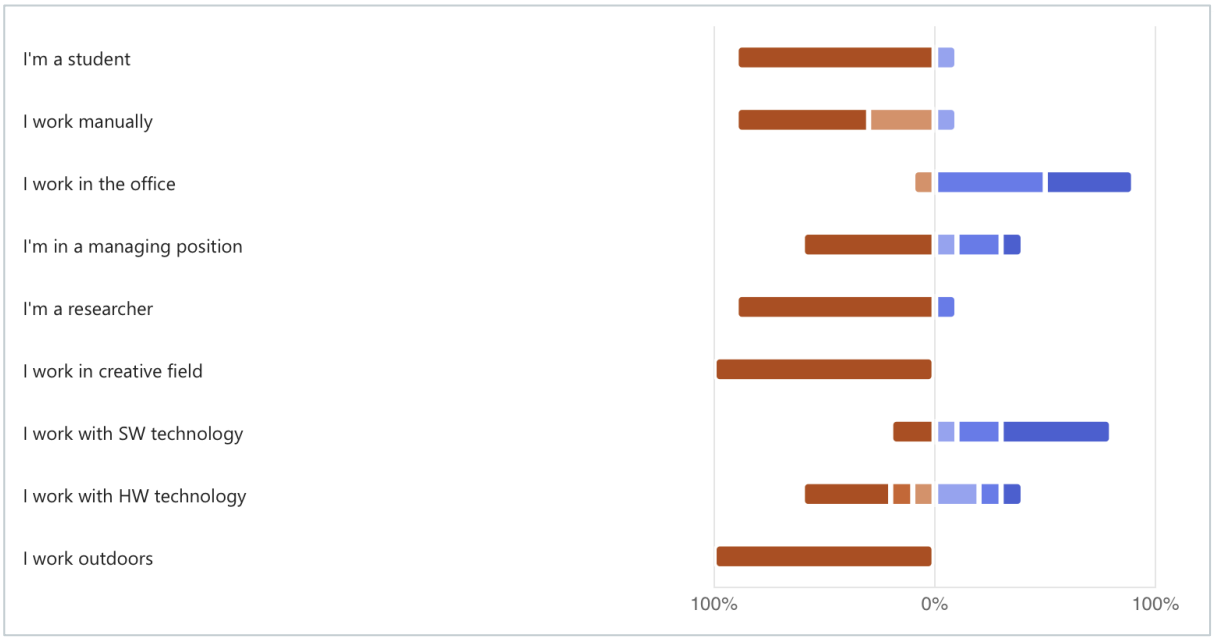
Most point out a paperless office, CRM, automated invoices and cloud-based filesharing as examples. Further administration processes, like HR, ordering supplies and so on are mentioned.

These are also the main seen potentials for digitalization/automation that are seen by companies when they are not implemented yet. A majority wants to go deeper.

The company owners/managing directors (36 - 45) are slightly older then the interviewed employees (26 - 35) in average. 100% of the interviewed persons were male.

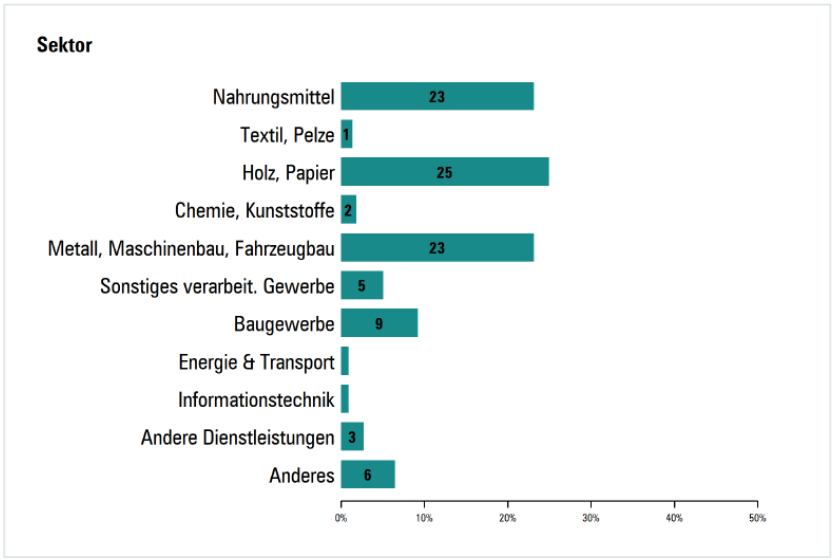
Most participants (15 out of 29) have a bachelor's or master's degree. None of the employees have a basic education as highest level but two of the employers.

All employers are full-time working for their company. Their main occupancy is most likely a job in the office, working with soft- and/or hardware.

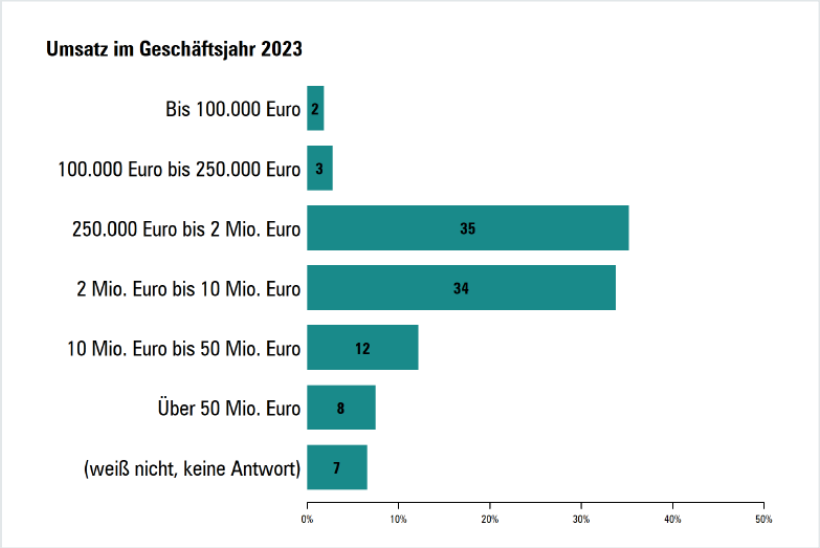


5. PP5 - NOI

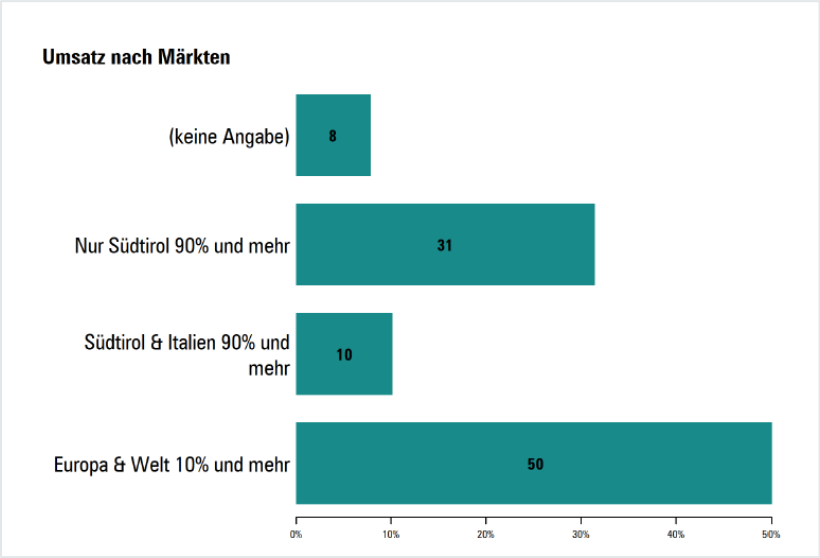
The target person who completed the questionnaire, and therefore probably also the person with the best insight into the needs in production, was an owner in over 40% of cases. Naturally, this proportion decreases with larger companies, but up to a company size of 50 employees, it can be assumed that production technology is very often in the hands of an owner. This responsibility structure must be considered when organizing further training measures. As a rule, the target persons are men, very often without a university degree.



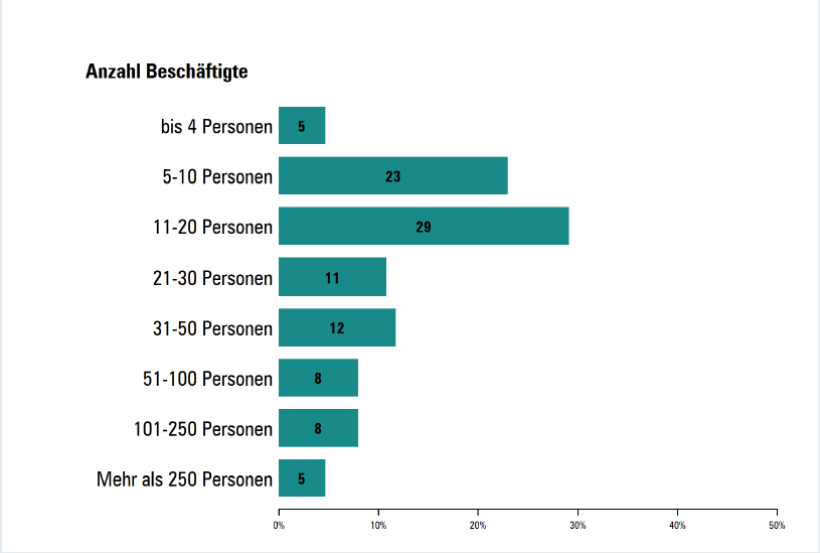
Food (23%); Textiles, furs (1%); Wood, paper (25%); Chemistry, plastics (2%); Metal, machinery, automotive (23%); Other manufacturing industries (5%); Construction (9%); Energy & Transport; Information technology; Other services (3%); Other (6%)



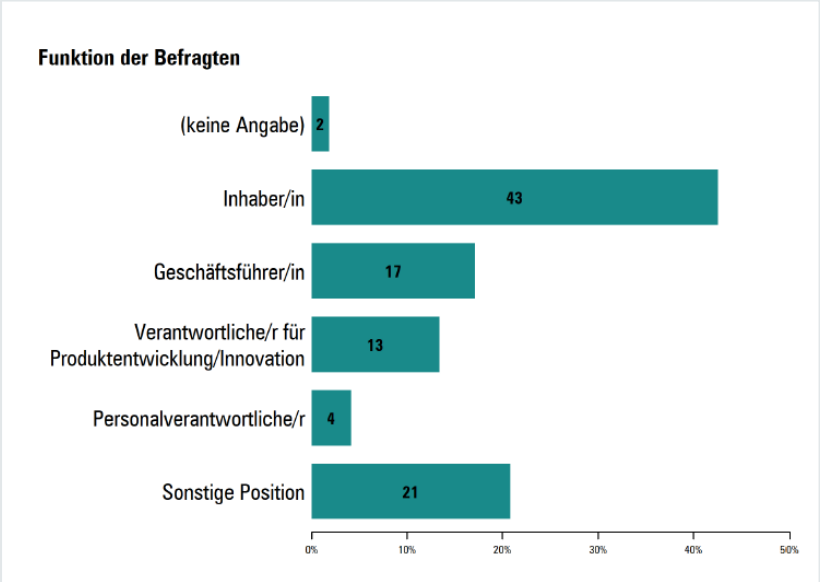
Up to 100,000 Euro (2%); From 100,000 Euro to 250,000 Euro (3%); From 250,000 Euro to 2 million Euro (35%); From 2 million Euro to 10 million Euro (34%); From 10 million Euro to 50 million Euro (12%); Over 50 million Euro (8%); (Don't know, no answer) (7%)



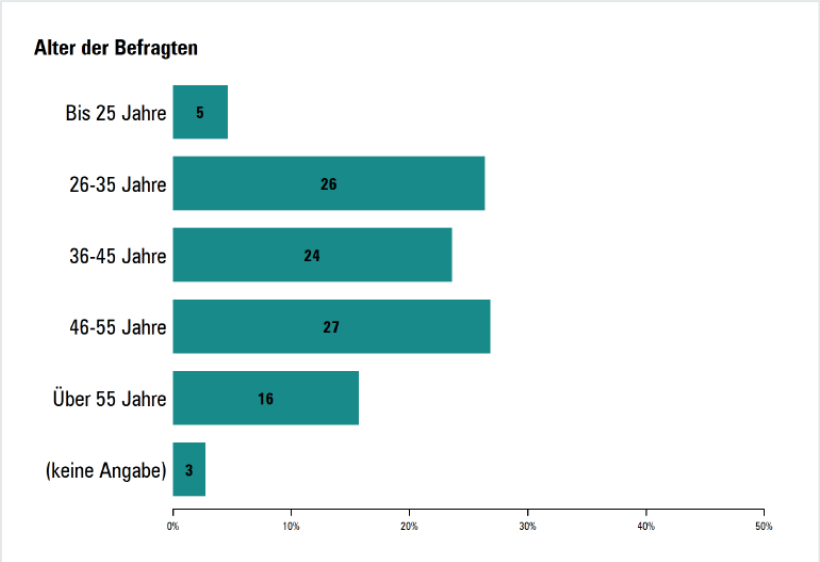
Sales by market; No information provided (8%); Only South Tyrol 90% and more (31%); South Tyrol & Italy 90% and more (10%); Europe & World 10% and more (50%)



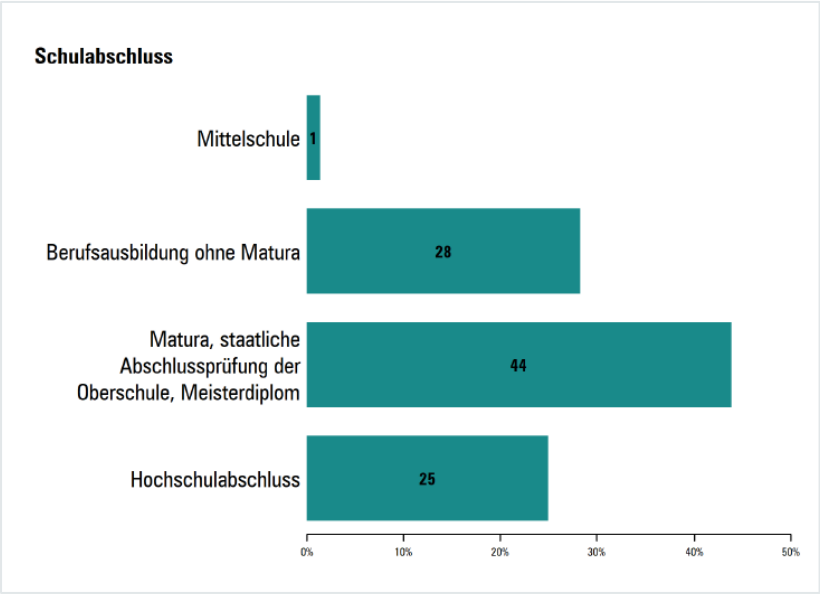
Number of employees; Up to 4 employees (5%); 5-10 employees (23%); 11-20 employees (29%); 21-30 employees (11%); 31-50 employees (12%); 51-100 employees (8%); 101-250 employees (8%); More than 250 employees (5%)



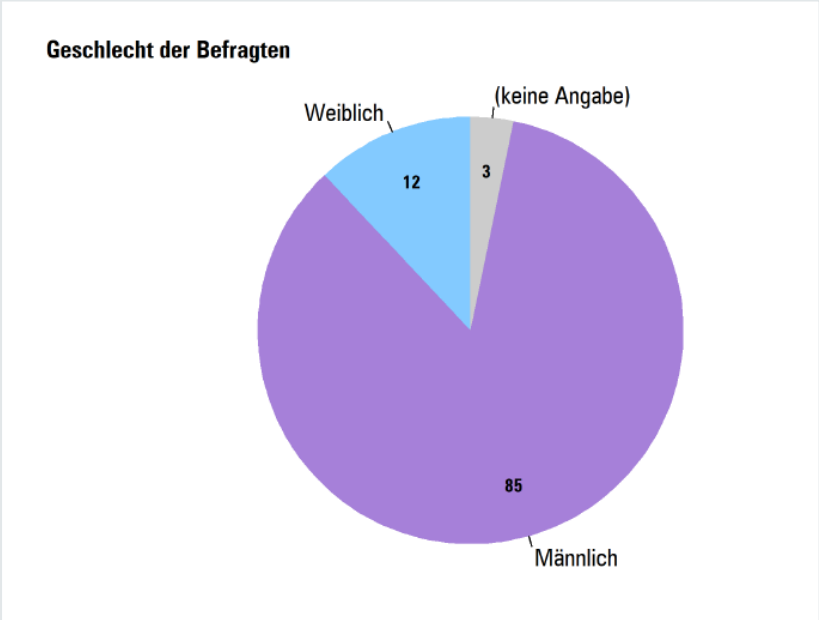
Respondent's role; No information provided (2%); Owner (43%); Managing director (17%); Responsible for product development/innovation (13%); Human resources responsible (4%); Other position (21%)"



Respondent's age; Up to 25 years (5%); 26-35 years (26%); 36-45 years (24%); 46-55 years (27%); Over 55 years (16%); No information provided (3%)



Educational background; Middle school (1%); Vocational training without Matura (28%); Matura, state final exam of secondary school, master's diploma (44%); University degree (25%)



Gender of respondents; Female (12%); No information provided (3%); Male (85%)

6. PP6 - FabLab Zagreb

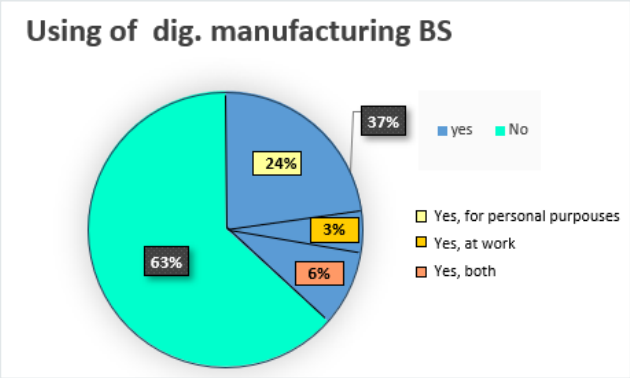
This target group, comprising individuals from less privileged backgrounds, represents a crucial demographic for developing digital fabrication skills. They face unique challenges in accessing educational resources and career opportunities, making skill development in digital technologies an important lever for enhancing employability and social mobility. By focusing on this demographic, we aim to provide equitable access to skills that can open doors to new career paths and improve long-term economic stability.

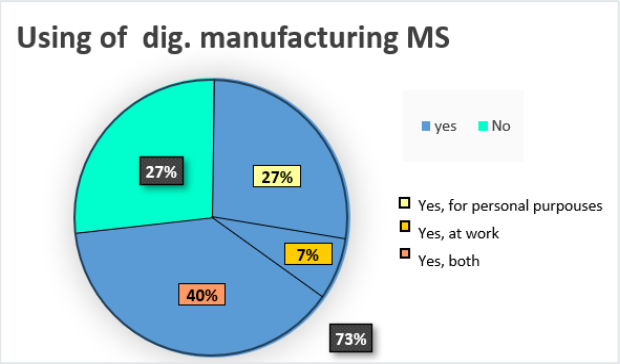
The survey respondents represent a diverse group across several demographic categories. In terms of age, respondents were primarily grouped as follows: younger than 18 (40), 36-45 (5), 46-55 (4), 26-35 (4), 56 and above (3), and 18-25 (1). For gender, 31 identified as female and 25 as male. The educational backgrounds of respondents included qualifications such as primary education (40), a master's degree (13), high school or equivalent (2), and a bachelor's degree (2). Job positions varied, with categories including student (17), employee (15), high school student (8), vocational certificate trainee (3), and self-employed (1), reflecting a range of roles within the event.

C. Experience level with digital manufacturing

1. LP1 - BUT

63% of bachelor's students don't use digital man. skills, while only 27% undergraduate students don't use them. The rest of the of students use it for personal purposes (24% bachelor's and 27% master's), at work (24% bachelor's and 7% master's), or for both (5% bachelor's and 40% master's). There is noticeable growth in number of students using digital man. Skills at higher educational level (35% increase).





Soft skills

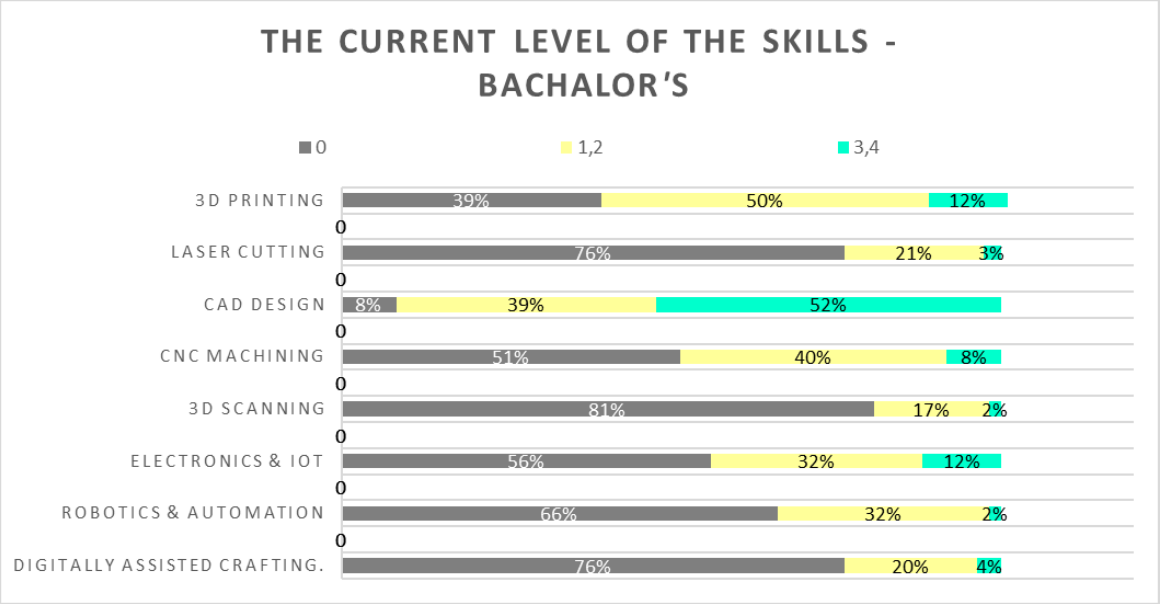
The bachelor's students are quite familiar with using basic soft skills, such as working in teams (74%), presenting their work for the audience (53%) or multitasking (85%).

Assurance at working in teams (77% versus 74%) and multitasking (87% versus 85%) almost has not changed for master's, while certainty at presenting has grown noticeably for master's (90% versus 53%)

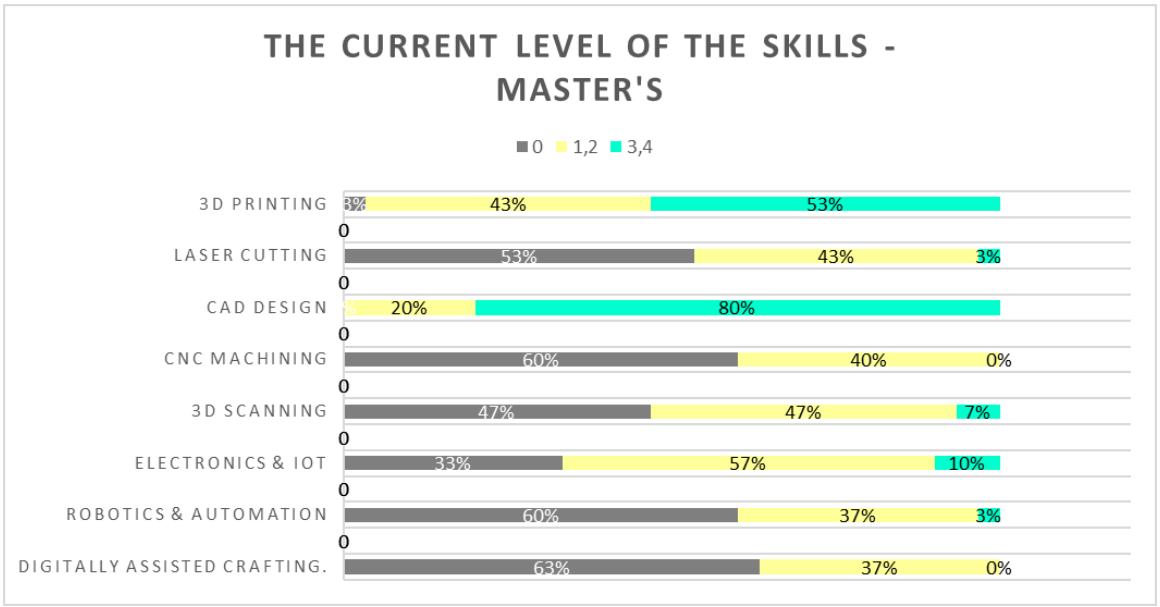
Hard skills

From a global perspective, the students are most experienced at 3D printing and CAD design. Some students have experience in these areas even before starting their university studies. At master's degree they acquire the highest level of experience in these skills. As for Robotics & automation, digitally assisted crafting or CNC machining, the experiences of the students have not changed much during the studies. Master's degree students can improve their skills in 3D scanning, laser cutting, and improvement is also noticeable in electronics & IOT skills.

Bachelor's degree students



Master's degree students



2. PP2 - FL Brno

This part of the survey was based on individual evaluation of respondents. It was divided into two parts – hard and soft skills. 39% responded they do use digital manufacturing – 80% of the use is in school/work the rest use is for personal purposes or both.

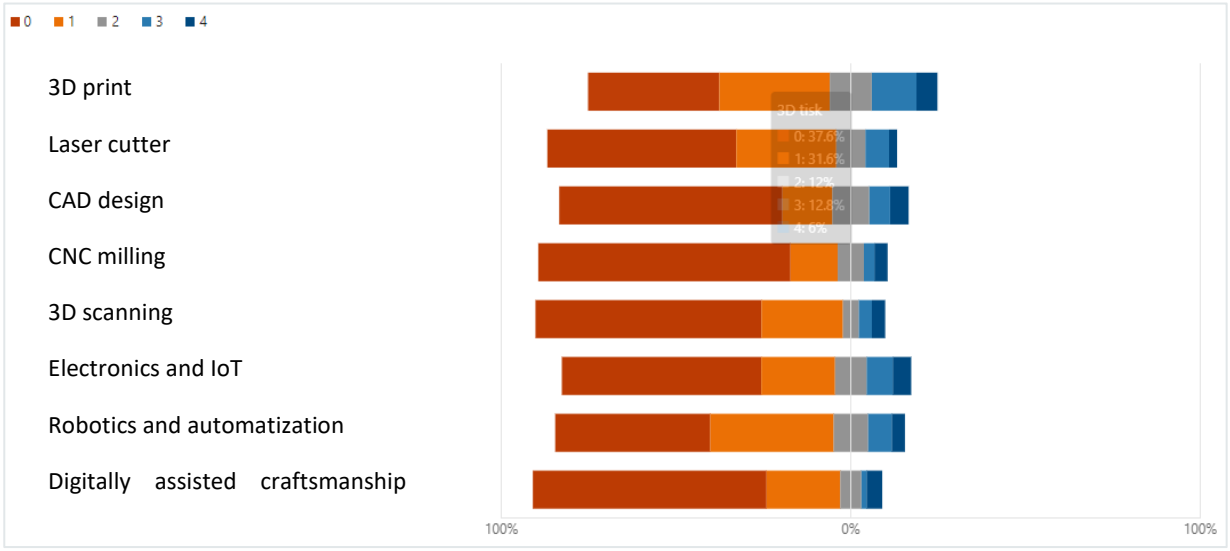
Respondents possess foundational **hard skills**, including basic familiarity with CAD software like AutoCAD and Fusion 360, introductory knowledge of 3D printing and CNC machining (particularly for those with a technical background), and some experience in electronics or prototyping. Many have a beginner-level understanding of design tools used in digital manufacturing. In terms of **soft skills**, they demonstrate problem-solving and logical thinking abilities, along with experience in teamwork, typically from academic

settings or small projects. They show creativity in approaching technical problems but often lack practical applications. While they are adaptable to new technologies, many lack real-world exposure to fully develop these skills. Overall, respondents have a solid foundation but would benefit greatly from hands-on experience and more targeted skill development in digital fabrication.

Here I will show more detailed skills the participants have.

Hard skills

In self-evaluation most people don't have any digital skill level. So, the gap is really big here. Most of them are familiar with 3D print, then electronics. See more details in a table below.

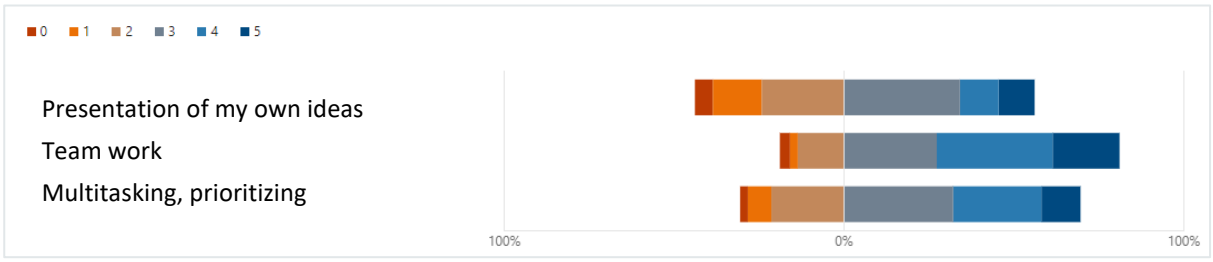


Breakdown of more specific knowledge for individual technologies - where is the biggest gap:

- 3D print - machine maintenance, selection and use of materials, complex solutions, machine control and slicing software, 3D modelling.
- Laser cutter - machine maintenance, selection and use of materials, complex solutions, vector graphics, machine control and slicing software
- CAD design – algorithmic design, parametric design, basics of 2D and 3D CAD software
- CNC milling - machine maintenance, CAM software, machine control
- 3D scanning – 3D scan application (reverse engineering), 3D scans post-processing, machine control
- Electronics and IoT – PCB design for IoT, Integration and interconnection of sensors, Microcontroller programming (Arduino etc.)
- Digitally assisted craftsmanship - increasing work efficiency, development of templates, jigs, fixtures

Soft Skills

Most people do not feel at all confident in presenting their own ideas in front of an audience, which the programs could also target.



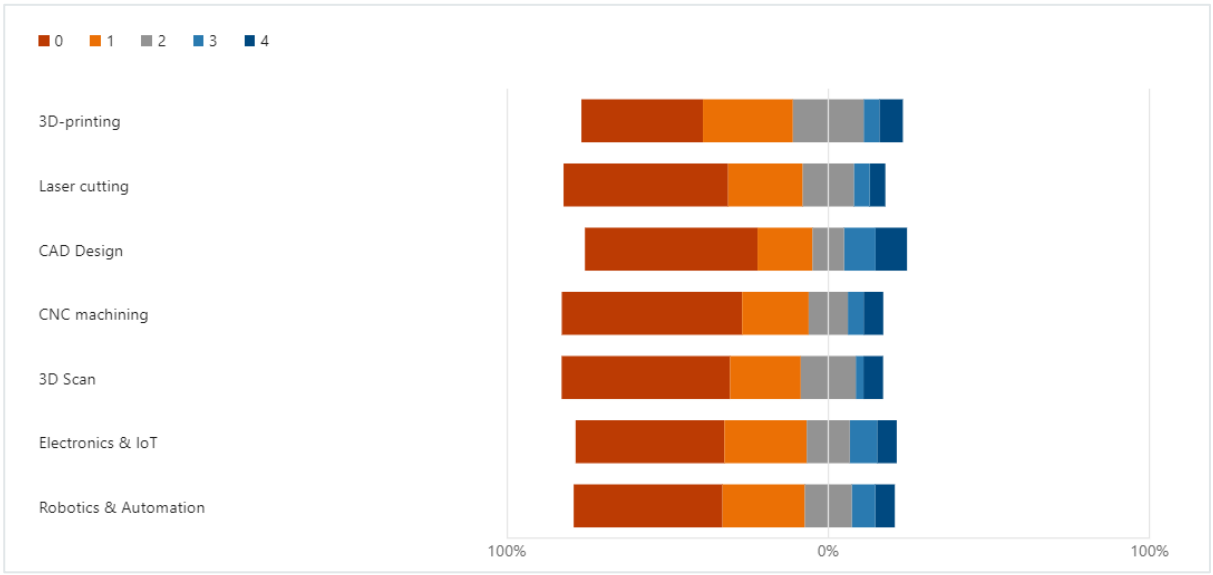
3. PP3 – HappyLab

The individual self-evaluation was separated in two parts - soft skills and hard skills. When it comes to digital fabrication 71% responded with no to the question: “Have you already had anything to do with digital manufacturing?” and 29% with “yes”.

Regarding the different technologies in this field of digital fabrication, the participants were asked to rate their self on a scale from 0 to 5: 0 – I am not comfortable with this at all, 5 – I enjoy doing this very much in the areas you see in the visualisation below.

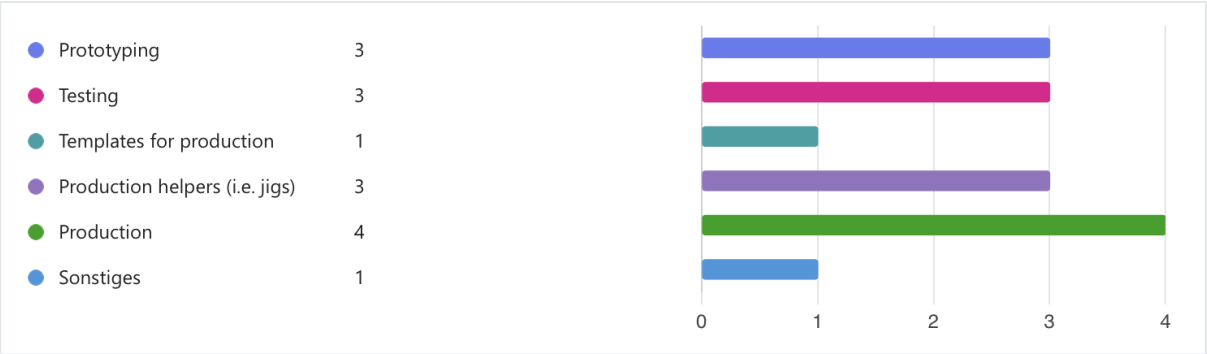
65% of respondents rated their knowledge of 3D printing as 0 or 1, and 74.4% gave the same low rating for 3D scanning. Additionally, 74.5% have never had any experience with laser cutting. In the fields of electronics and IoT, as well as robotics and automation, over 70% reported not having relevant knowledge. 70% have no or very little knowledge of CAD Design and 76% in CNC machining. These results highlight a significant knowledge gap in digital fabrication skills among the apprentices in our partner organizations.

What level of skill do you have in the following topics:



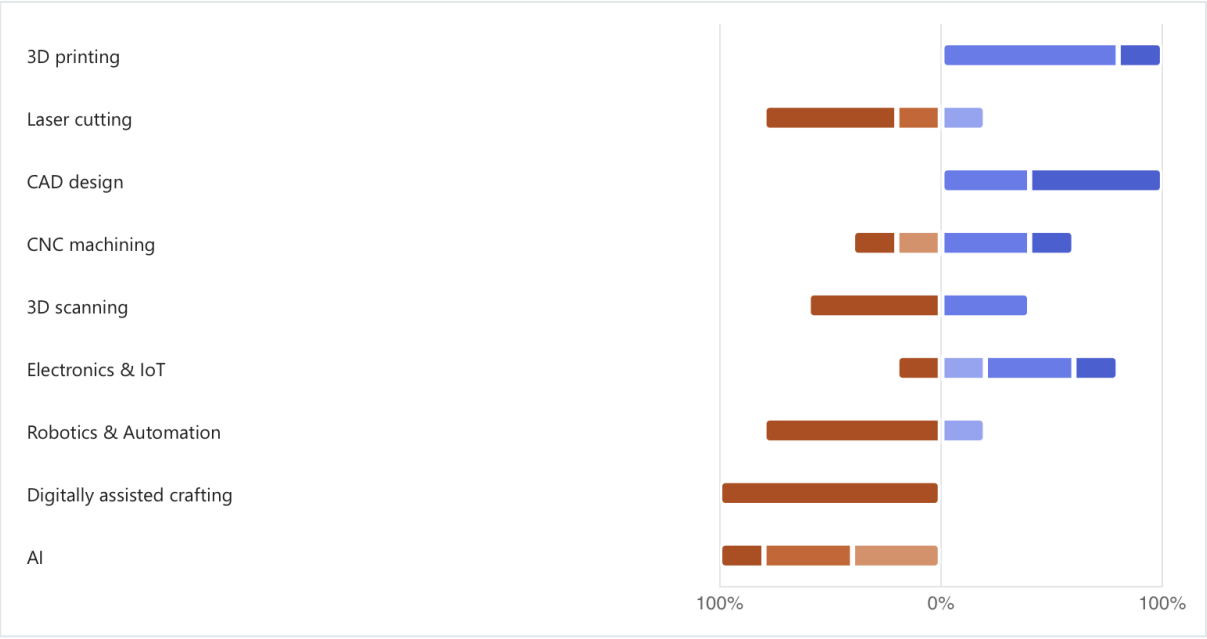
4. PP4 - Brigk

Five of the interviewed companies are using digital fabrication in their work. This splits into different usage in the product cycle.



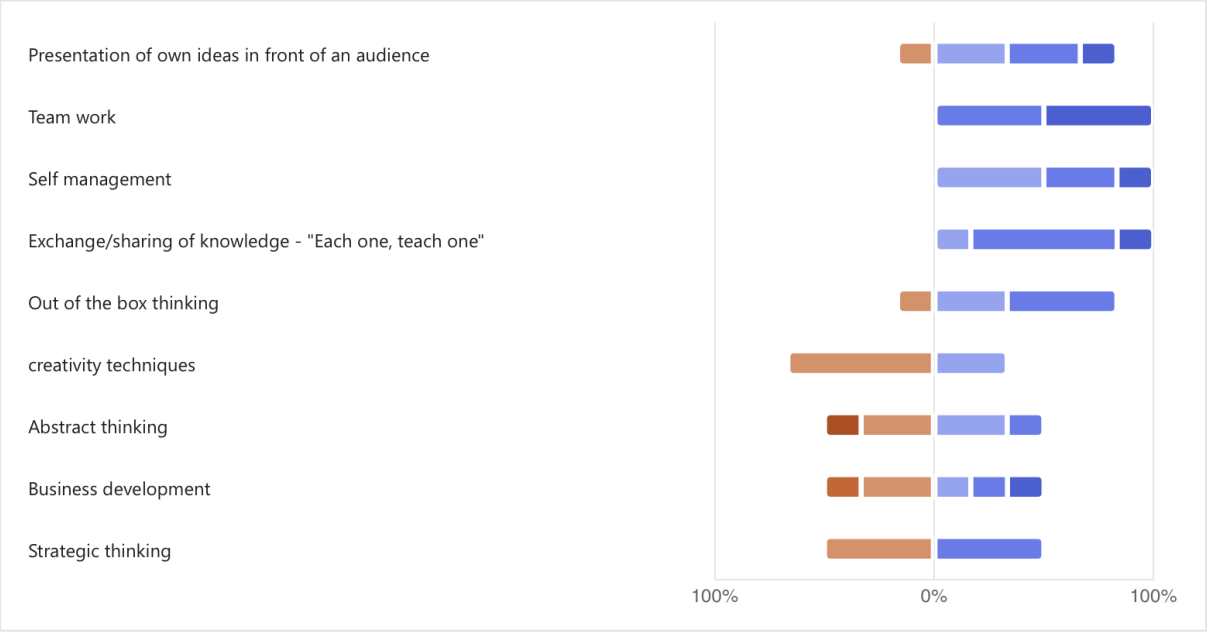
Most experience is seen in CAD, which is also the most use method, which has influence of the whole product cycle. The usage of 3D-printing is more likely for prototyping, only one company is producing the actual product partly with it.

Electronics and IoT is often used for automation or processes in the workflows, but not in the actual production or provided services.



All companies confirm that the application brings positive impact with it. Especially being flexible in adjustments and fast reaction in belongings of adaption are mentioned here.

The set of soft-skills is quiet well developed. The responsible persons see lacks in the usage of creativity techniques to support out of the box thinking. Also, the capability to have business and strategy of the company in mind can be evolved.

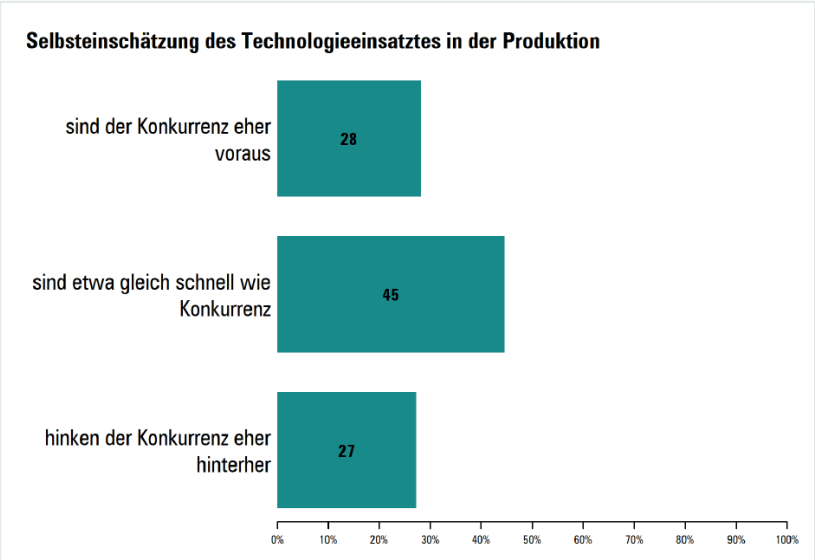


The responses by the employees quite match the results of the employers, with no significant differences.

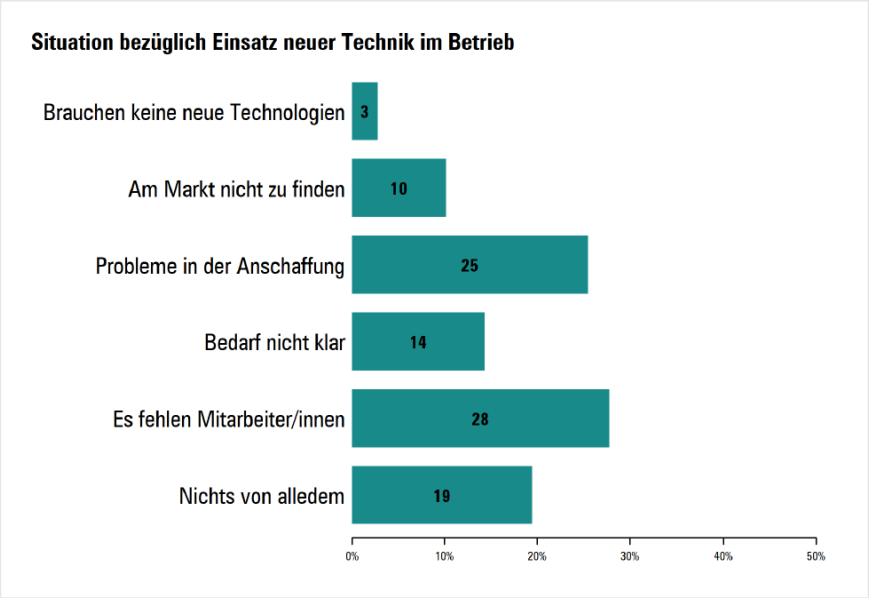
5. PP5 – NOI

The self-assessment of businesses regarding the use of new technologies in production shows that there are both pioneers and laggards.

There is a correlation with company size: smaller businesses often see themselves as laggards, while larger ones more frequently view themselves as pioneers. Overall, the responses indicate a **clear demand for new technologies**: only 3% of businesses reported not needing any new technology. **The project's direction also seems correct, as a good quarter of the businesses indicated a lack of competent employees**, especially in companies with more employees.



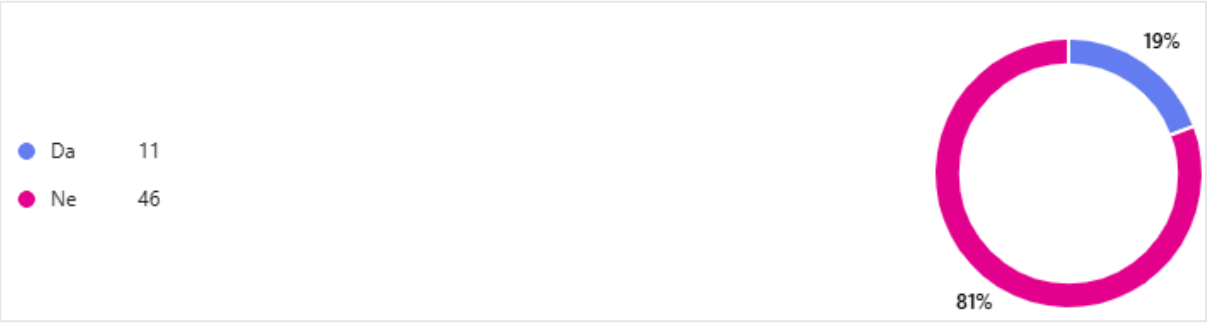
Self-assessment of technology use in production; are ahead of the competition (28%); are about as fast as the competition (45%); are lagging behind the competition (27%)

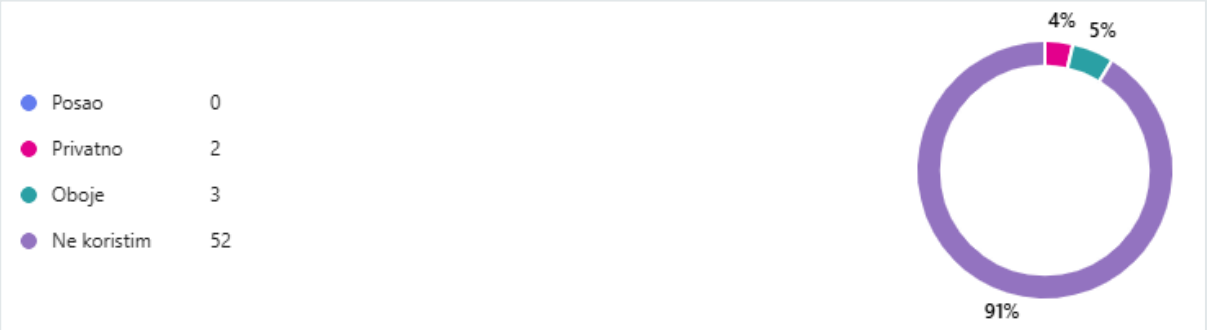


Situation regarding the use of new technology in the company; Do not need new technologies (3%); Not available on the market (10%); Problems with procurement (25%); Needs not clear (14%); Lack of employees (28%); None of the above (19%)

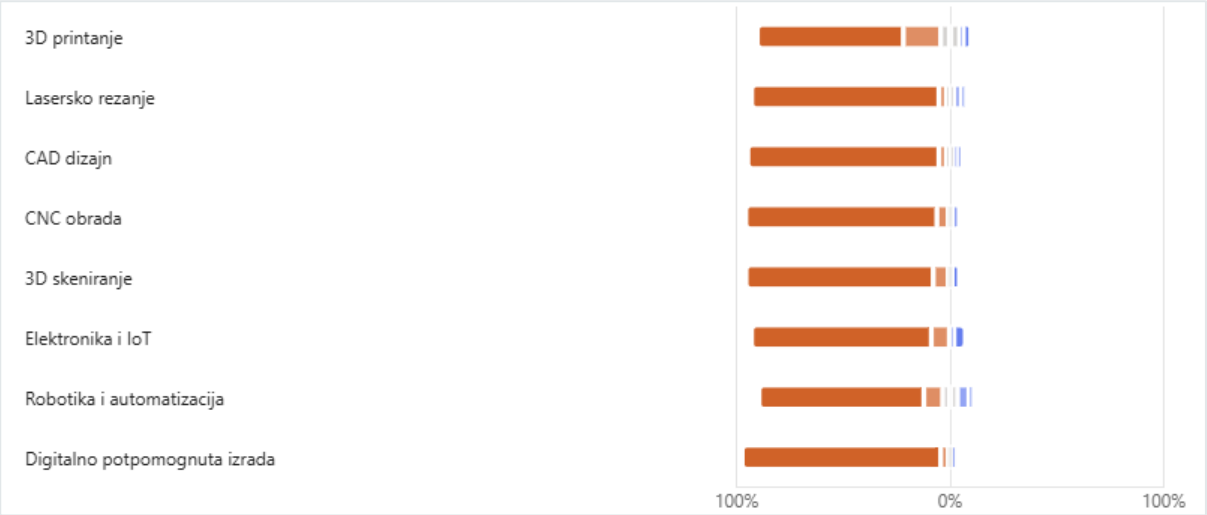
6. PP6 - FabLab Zagreb

Most respondents reported limited experience with digital manufacturing, with 46 indicating they do not use digital manufacturing at all, and only 11 stating they do. Additionally, when asked about specific uses of digital manufacturing, 52 indicated they do not utilize it in any context, while a small portion (5 respondents) reported using it either privately or for both personal and professional purposes. These findings reflect a generally low experience level with digital manufacturing among the target group.

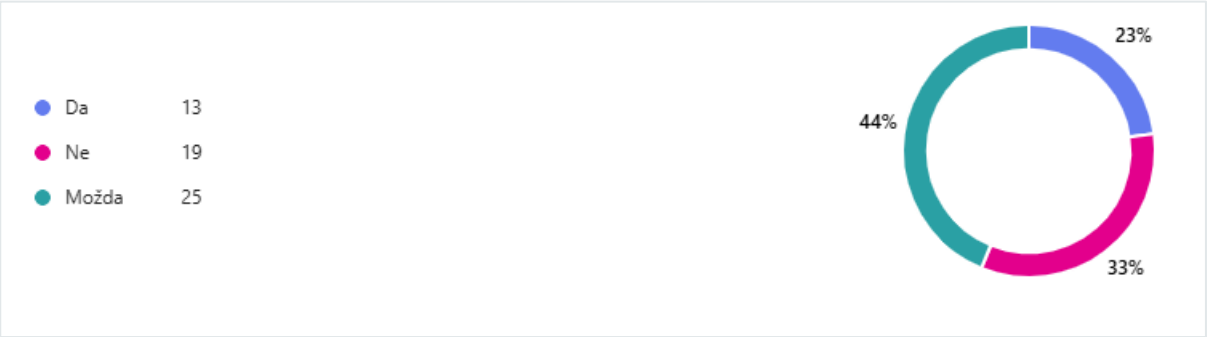




The survey results indicate that most respondents have limited engagement with advanced digital manufacturing technologies. For instance, few have experience with laser cutting, CNC machining, or 3D scanning. Among those who do, their skills are primarily at the introductory level, such as operating basic equipment or handling simple 3D design software. A small number of respondents reported more hands-on experience, including troubleshooting 3D printers, performing vector graphic design for laser cutting, and programming microcontrollers like Arduino for IoT applications.



Furthermore, when asked if they would consider reskilling programs for digital manufacturing, many responded with interest ("Možda" or "Da"), indicating a willingness to learn despite current skill limitations. This feedback highlights a general openness to digital upskilling, although present experience levels remain low.



D. Desired and needed skills

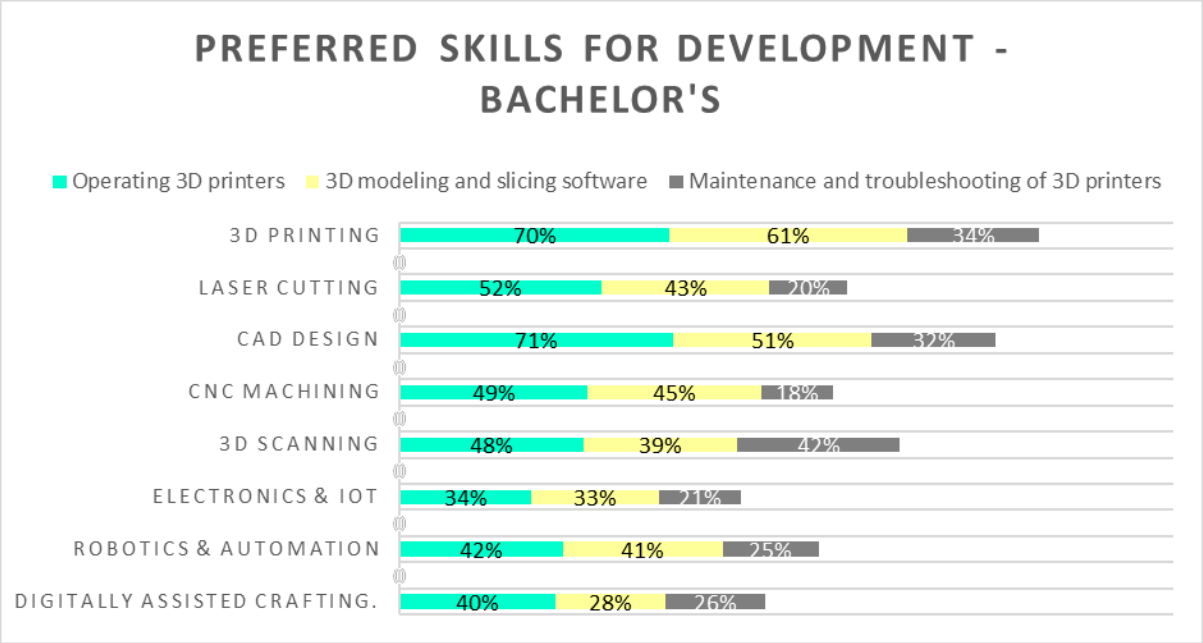
1. LP1 – BUT

In this chapter, we mapped out the preferences of individual survey participants within our target group regarding both general areas (3D printing, CAD design, etc.) and, more specifically, the type of skills in these areas they would like to further develop. This gives us insight into the preferences of our target group. At the same time, we can align these preferences with the conclusions of the Landscape report regarding company expectations and needs.

The results are again divided into groups of Bachelor's and Master's students to identify potential differences between these educational levels. The specific sub-areas in the following charts generally include: 1. Basic operation of the given equipment, 2. Software tools associated with the technology,

3. Maintenance or other advanced tasks related to the technology. The chart labels specify these details for 3D printing. Percentages indicate the proportion of this response from all participants within the respective group (Bachelor's, Master's).

Bachelor's degree students

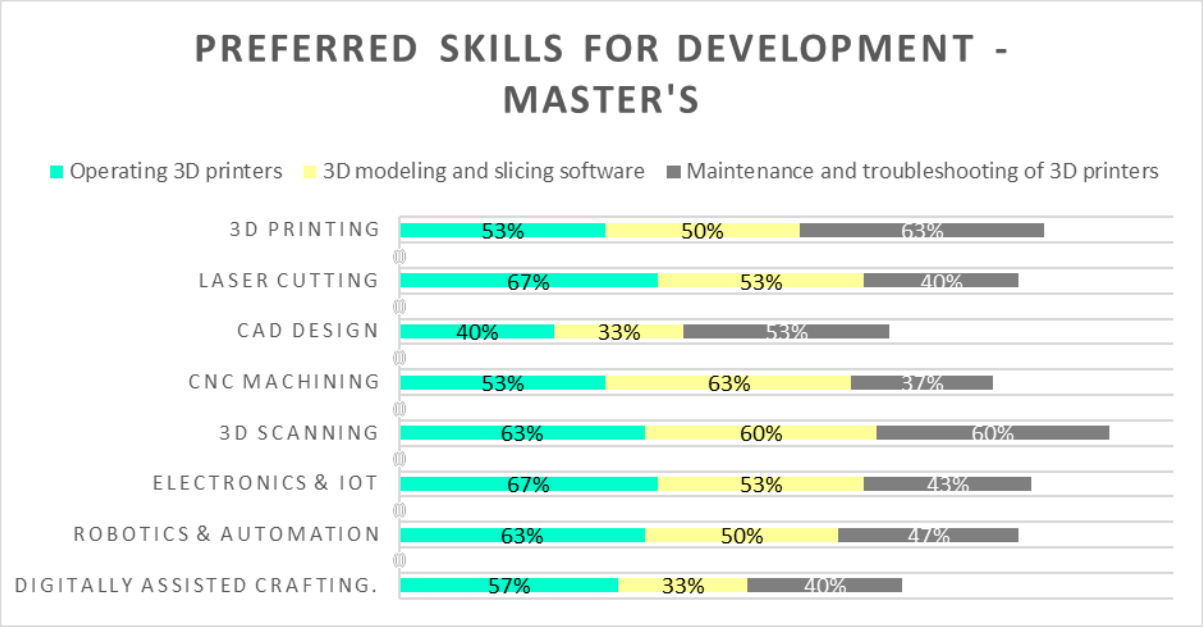


The survey results among Bachelor's degree students show the greatest interest in the areas of 3D printing and CAD design, both in basic operation of these technologies and in more advanced skills. The overall ranking of interest in each area (in terms of basic operation of the technology) is as follows:

1. CAD design
2. 3D printing
3. Laser cutting
4. CNC machining
5. 3D scanning
6. Robotics and automation
7. Digitally assisted crafting
8. Electronics and IoT

Other interesting findings (with a slight interpretation) that can be drawn from the results are as follows:

- Bachelor's degree students are still in the early stages of their studies and expect to gain skills in using CAD software, which was often a reason they chose this field (engineering).
- 3D printing remains a very interesting topic for them, where they would like to expand their knowledge and skills.
- There is also interest in developing skills related to 3D scanning, especially in using scanned data for further applications.



The survey results among Master's degree students indicate that their interests are almost entirely in the opposite order compared to Bachelor's degree students. There is a strong preference for areas like Electronics and IoT, laser cutting, and robotics and automation. The overall ranking of interest in each area (in terms of basic operation of the technology) is as follows:

1. Electronics and IoT
2. Laser cutting
3. Robotics and automation
4. 3D scanning
5. Digitally assisted crafting
6. 3D printing
7. CNC machining
8. CAD design

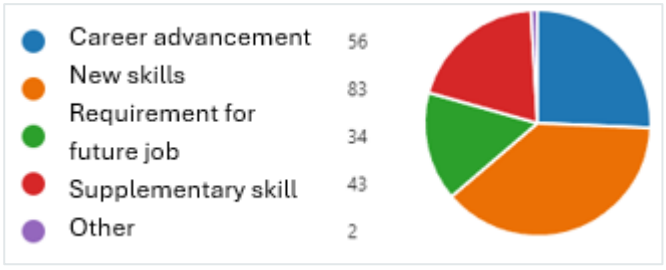
Other interesting findings (with slight interpretation) drawn from the results are as follows:

- Master's degree students show a preference for more advanced skills (maintenance, tuning, etc.) in each area compared to Bachelor's degree (grey bars have a larger share across all areas compared to Bachelor's).
- CAD is in the background, with the sub-area of algorithmic modelling dominating, which again highlights the focus on more advanced aspects of digital technologies.
- 3D scanning is coming to the forefront, with a particular interest (as with Bachelor's, but to a greater extent) in skills for utilizing 3D scanned data for further applications.
- Except for a few areas (3D printing, CAD design), the overall numbers are higher, illustrating the increased interest in digital manufacturing technologies within this group of students.

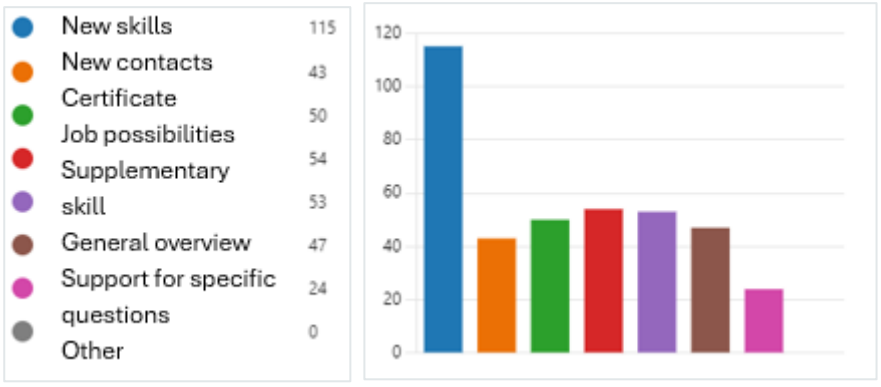
2. PP2 - FL Brno

Would you consider a program to retrain or upskill in digital manufacturing? Interestingly, 38 respondents said yes, and 68 respondents said maybe - which is an important part for our programs to reach.

Also, most of the respondents were motivated to gain new skills but they see the potential in the their career development.



They also understand the importance of networking and they expected their general insight to be greatly extended in these subjects.



Needs of respondents:

Practical, Hands-On Training: The group needs exposure to real-world applications of digital manufacturing technologies, such as 3D printing, CNC machining, and CAD design, to complement their theoretical knowledge.

Soft Skills: In addition to technical skills, they need to develop soft skills like teamwork, problem-solving, and adaptability, which are essential in modern, collaborative work environments.

Accessible Learning Formats: Given their educational commitments, this group benefits from flexible training options, such as hybrid programs that combine in-person workshops with online learning.

Career Guidance: The group needs clear guidance on how digital fabrication skills can open up diverse career opportunities, both in technical fields and in emerging industries influenced by digital transformation.

3. PP3 – HappyLab

This section analyzes the skills and technologies that apprentices identified as relevant for their professional development in digital manufacturing. Participants were asked to evaluate various technologies and topics, selecting those they considered beneficial for their work while excluding those deemed irrelevant. Below are the selected technologies with the percentage of participants who identified them as valuable:

3D print - machine maintenance, selection and use of materials, complex solutions, machine control and slicing software, 3D modelling was interesting for over **35%**

Laser cutter - machine maintenance, selection and use of materials, complex solutions, vector graphics, machine control and slicing software was interesting for **39%**

CAD design – algorithmic design, parametric design, basics of 2D and 3D CAD software was interesting for **49%**

CNC milling - machine maintenance, CAM software, machine control interesting for **38%**

3D scanning – 3D scan application (reverse engineering), 3D scans post-processing, machine control was interesting for **47%**

Electronics, IoT, Robotics – PCB design for IoT, Integration and interconnection of sensors, Microcontroller programming (Arduino etc.) was interesting for **34%**

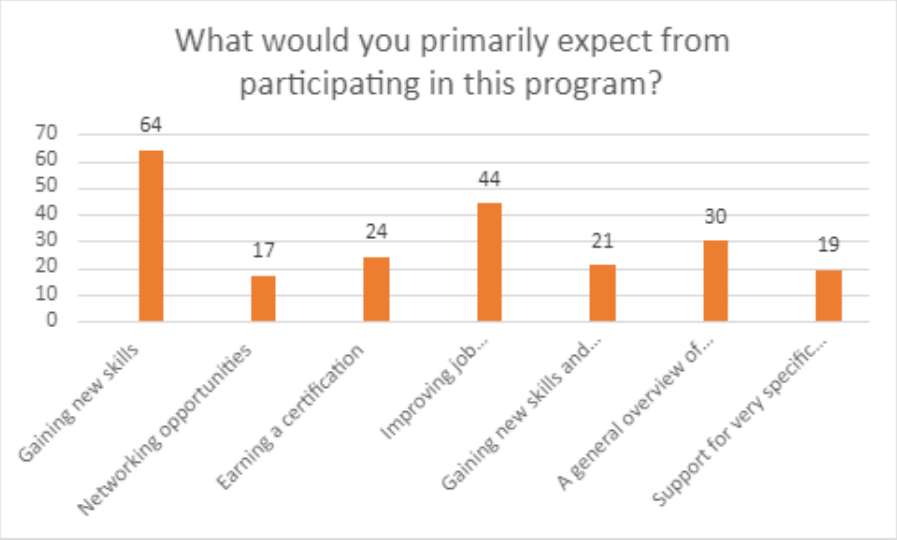
Digitally assisted craftsmanship - increasing work efficiency, development of templates, jigs, and fixtures was interesting for **34%**

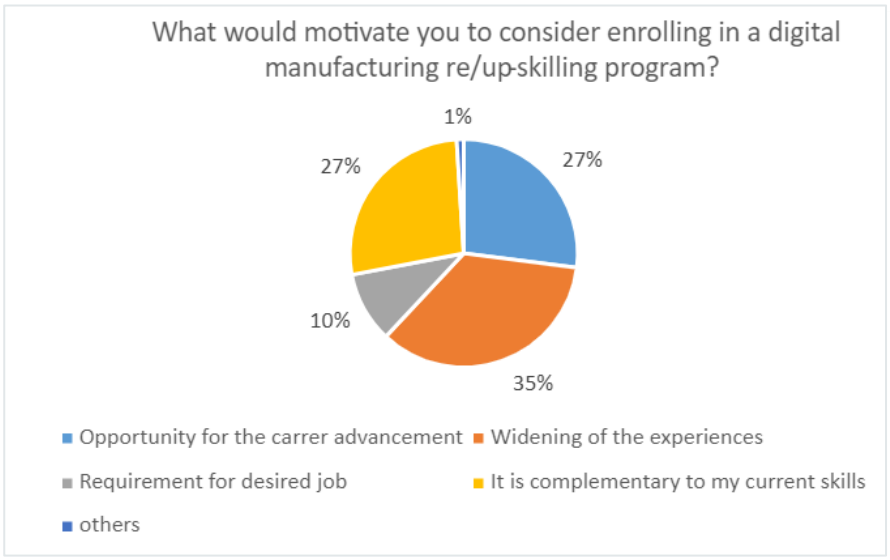
The survey revealed strong interest in digital manufacturing training programs, with 77% of respondents showing potential engagement: 37% expressing definite interest and 40% indicating they might consider participating. This significant response rate demonstrates the substantial potential reach of our proposed programs. Respondents' motivations for participating were captured through two key questions:

"What would you primarily expect from participating in this program?"

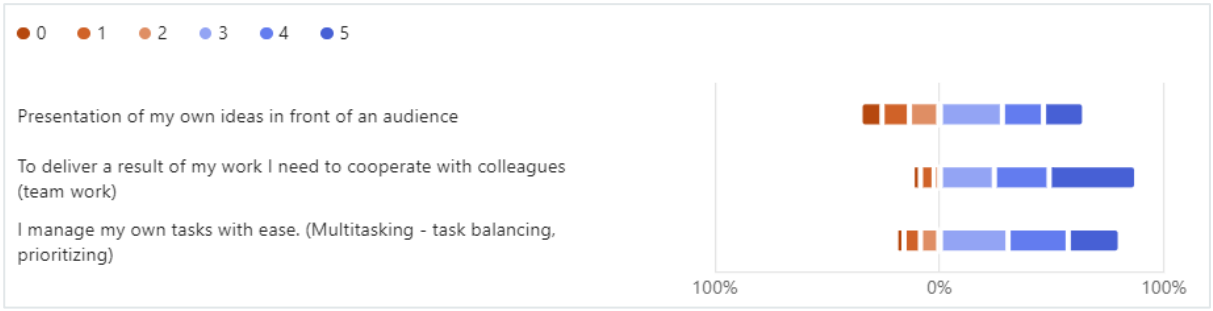
"What would motivate you to consider enrolling in a digital manufacturing re/up-skilling program?"

The responses highlighted that most participants are primarily motivated by career development opportunities and gaining new skills.





If we have a closer look at the soft skills and the question “How comfortable are you with the following soft skills?” Most of the participants would say, they have good soft skills. The biggest deficits are in the “Presentation of my own ideas in front of an audience” within our target audience.



4. PP4 - Brigk

The conclusion of the survey is not illustrated by graphs, as the results are composed out of the separated datasets of the employers and employees.

For the future, most companies rate themselves as quite well prepared regarding the skills of their employees.

If used right now or planned for the future, the set of skills for digital fabrication are focused on the special needs of the companies.

Most mentioned as an interesting field is 3D-printing on a full scale from operating the machines up to the ability of maintenance and troubleshooting. Half of the firms want to implement the technology, most of these on a deeper level.

3D-Scanning is used rarely right now but wished to be implemented by 50% of the companies also on a full scale. Reverse engineering is one of the most interesting topics in this.

Companies that are producing, either own products or production as a service, are working with 3D-data. The basics of CAD are widely spread. For the active users the expansion of existing skills are the main goal. Especially the capability of parametric design is wished, followed by algorithmic design.

Artificial intelligence (AI) is by far the most demanded skill. 80% are interested in a deeper knowledge of using (existing) Large Language Models like ChatGPT in their work. Prompt engineering and implementation as a approach for problem solution is followed by the capabilities as a software coding tool. Some mentioned also the ability to set up local solutions to comply to privacy and secret protection. Further the whole scope of machine and deep learning is a desired skill for 60%. Understanding of these and data science, analysis and engineering are the main points.

The survey couldn't show any high potentials in private interests for the companies so far. 3D-printing is the most common digital fabrication method as a hobby followed by electronics and IoT.

5. PP5 – NOI

The need, current use, and support requirements for digital production technologies were assessed in multiple stages:

Stage 1: Is the technology relevant at all?

Stage 2: Of the relevant technologies, are they already being used?

Stage 3: Of the relevant technologies, is there a need for support?

It is evident that among the 10 technological fields, some have potential across all industries, while others are more industry-specific. The following technological fields were mentioned particularly often:

CAD/CAE: This includes 2D/3D design on the computer as well as computer simulation.

Use of Robots in Production: Implementing robotics to enhance production processes.

Milling and CAM: This involves the programming and use of computer-controlled machine tools for cutting and shaping materials.

Use of Artificial Intelligence in Production: Integrating AI to optimize and innovate production techniques.

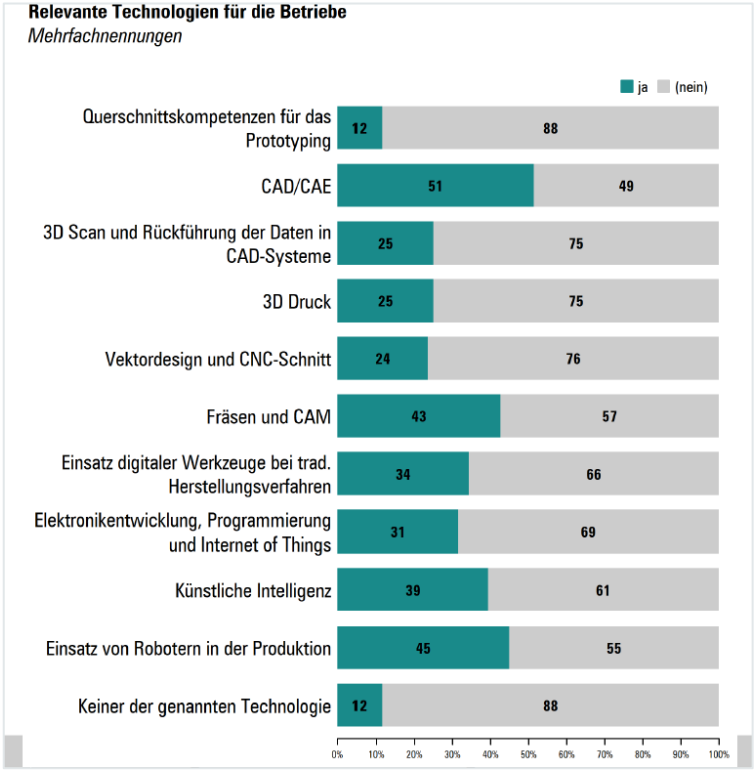
When looking at businesses that indicate a particular technology is relevant to them and then distinguishing whether it is already being used, the proportion of businesses not using the technology can be seen as an indicator of the need for support. **Technologies that are often not used, despite being considered relevant, include:**

Cross-functional competencies for prototyping: This involves a systematic, iterative approach to developing new ideas and solutions using specific methods.

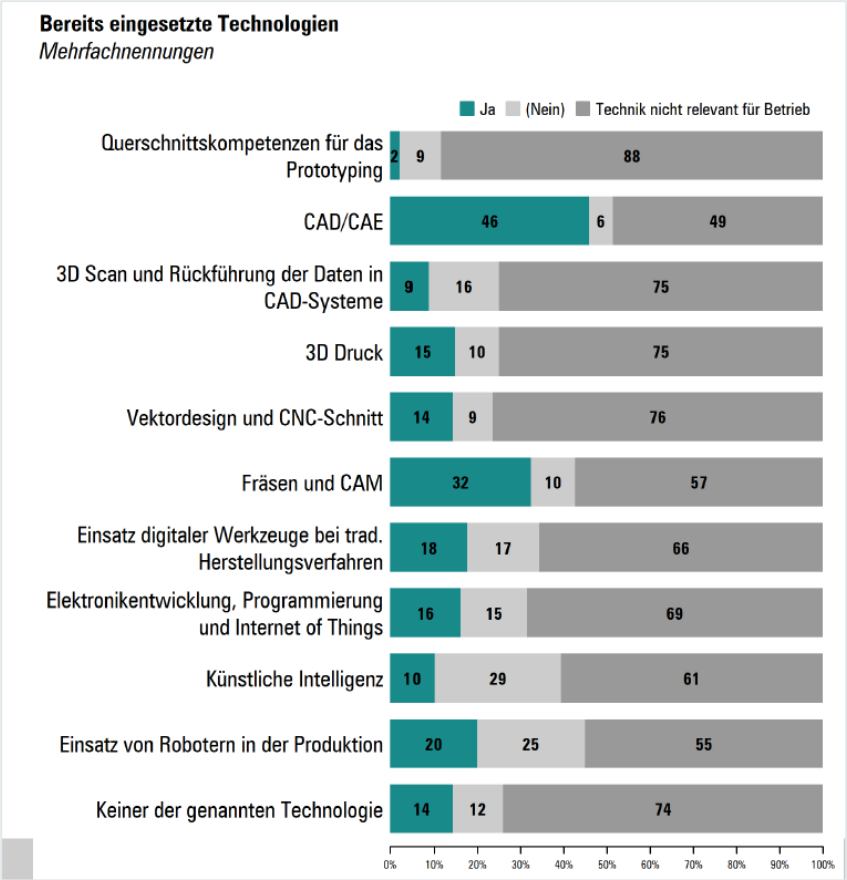
Artificial Intelligence: The integration and application of AI in production processes.

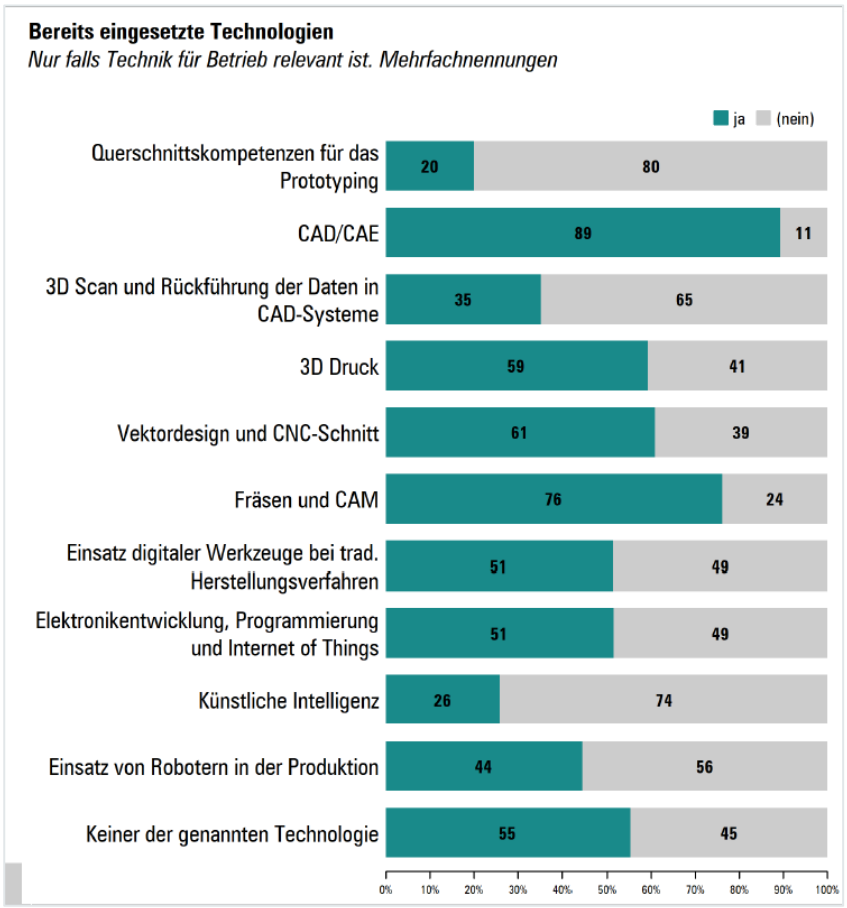
3D Scanning and Data Integration into CAD Systems: The use of 3D scanning technology and the subsequent integration of this data into CAD systems.

Relevant technologies for companies; Cross-functional skills for prototyping (yes: 12%; no: 88%); CAD/CAE (yes: 51%; no: 49%); 3D scan and data feedback into CAD systems (yes: 25%; no: 75%); 3D printing (yes: 25%; no: 75%); Vector design and CNC cutting (yes: 24%; no: 76%); Milling and CAM (yes: 43%; no: 57%); Use of digital tools in traditional manufacturing processes (yes: 34%; no: 66%); Electronics development, programming and Internet of Things (yes: 31%; no: 69%); Artificial intelligence (yes: 39%; no: 61%); Use of robots in production (yes: 45%; no: 55%); None of the mentioned technologies (yes: 12%; no: 88%)



Already implemented technologies; Cross-functional skills for prototyping (yes: 12%; no: 88%); CAD/CAE (yes: 46%; no: 49%); 3D scan and data feedback into CAD systems (yes: 9%; no: 16%; not relevant: 75%); 3D printing (yes: 15%; no: 10%; not relevant: 75%); Vector design and CNC cutting (yes: 14%; no: 9%; not relevant: 76%); Milling and CAM (yes: 32%; no: 10%; not relevant: 57%); Use of digital tools in traditional manufacturing processes (yes: 18%; no: 17%; not relevant: 66%); Electronics development, programming and Internet of Things (yes: 16%; no: 15%; not relevant: 69%); Artificial intelligence (yes: 10%; no: 29%; not relevant: 61%); Use of robots in production (yes: 20%; no: 25%; not relevant: 55%); None of the mentioned technologies (yes: 14%; no: 12%; not relevant: 74%)

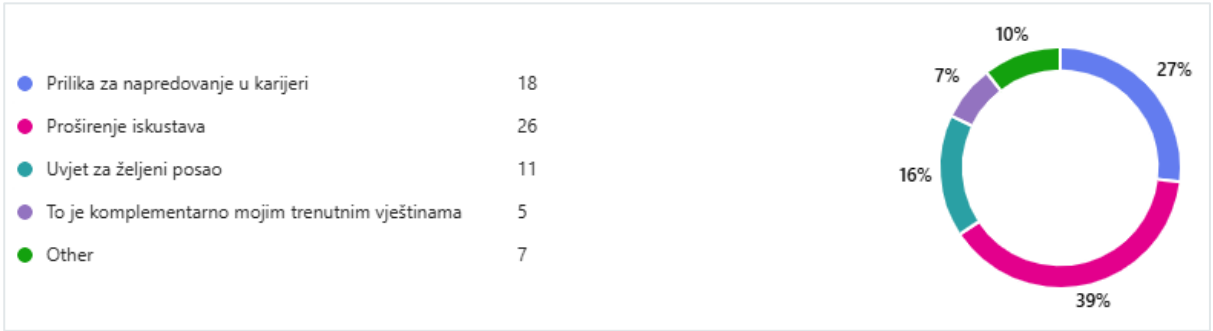




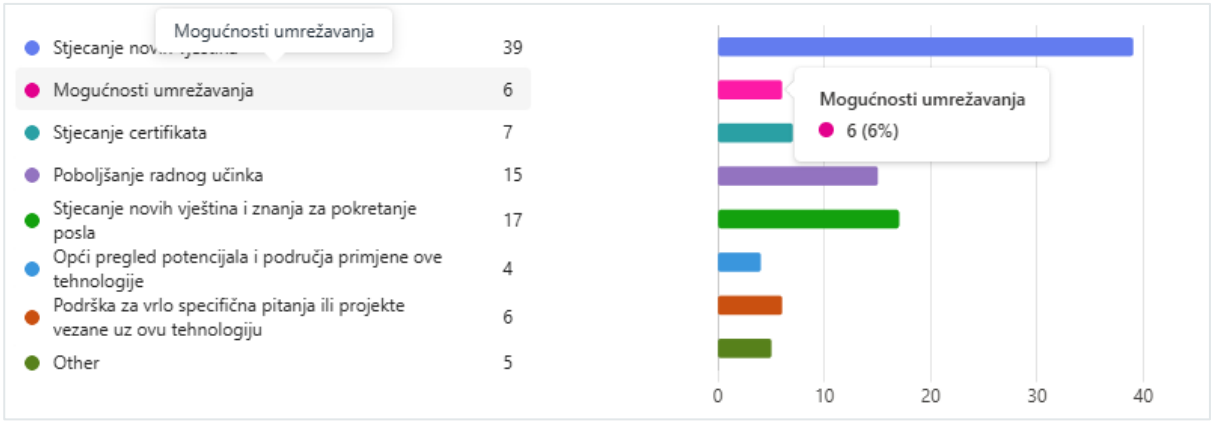
Already implemented technologies, only if technologies are relevant: Cross-functional skills for prototyping (yes: 20%; no: 80%); CAD/CAE (yes: 89%; no: 11%); 3D scan and data feedback into CAD systems (yes: 35%; no: 65%); 3D printing (yes: 59%; no: 41%); Vector design and CNC cutting (yes: 61%; no: 39%); Milling and CAM (yes: 76%; no: 24%); Use of digital tools in traditional manufacturing processes (yes: 51%; no: 49%); Electronics development, programming and Internet of Things (yes: 51%; no: 49%); Artificial intelligence (yes: 26%; no: 74%); Use of robots in production (yes: 44%; no: 56%); None of the mentioned technologies (yes: 55%; no: 45%)

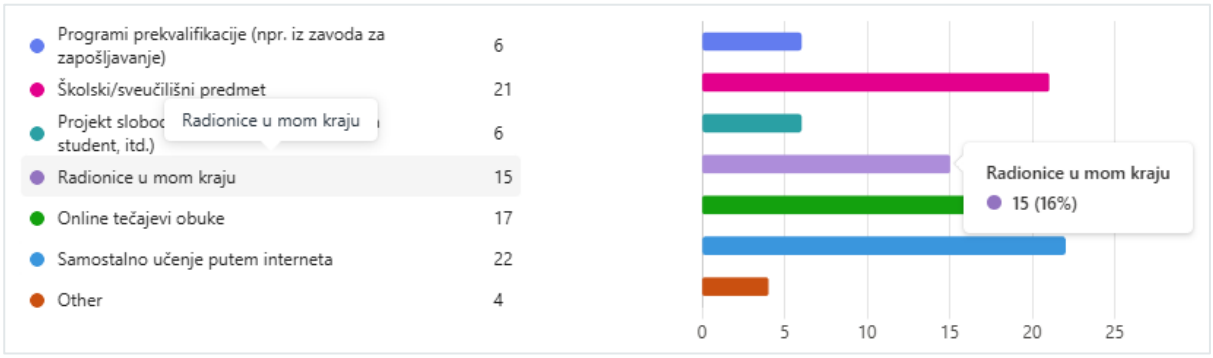
6. PP6 - FabLab Zagreb

Respondents expressed a strong interest in expanding their experiences and advancing their careers through digital manufacturing skills. Key motivations included career advancement and gaining new experiences in the field. In terms of expectations, many respondents hoped to gain new skills and improve their work performance, with some additionally seeking certifications to validate their learning.



Preferred training formats leaned toward formal education courses and local workshops, with a blend of in-person and online options. Live workshops were a particularly popular format, reflecting a desire for interactive, hands-on learning experiences. This feedback indicates a strong demand for structured, practical training opportunities, ideally with options for certification.





E. Form and type of the support

1. LP1 – BUT

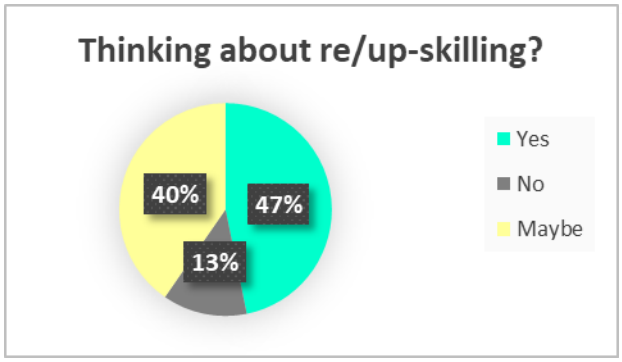
In this chapter, we mapped the survey participants' interest in planned re/up-skilling programs, their motivation for completing them, their expectations from the programs, preferred program formats, and any potential barriers to participation.

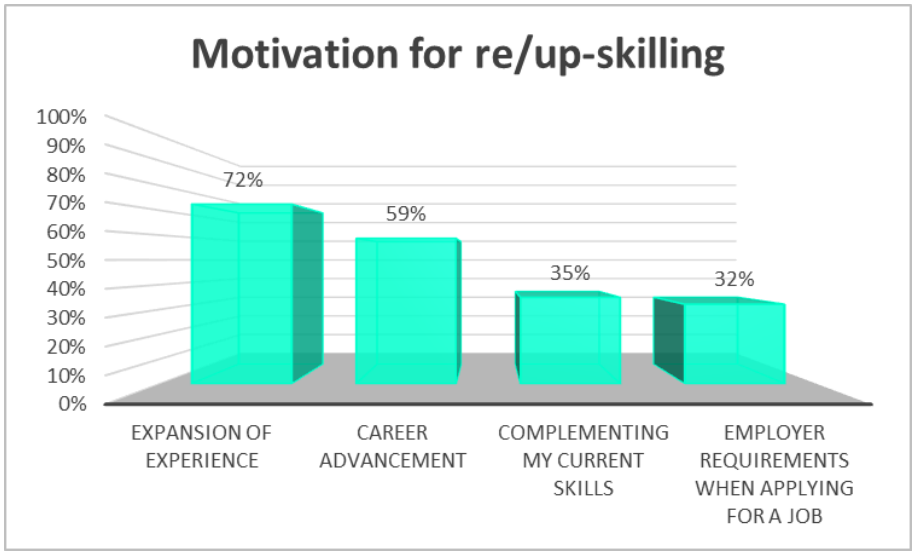
Overall results from both groups of participants show that there would be interest in such programs, with the main motivation being to expand their existing experience.

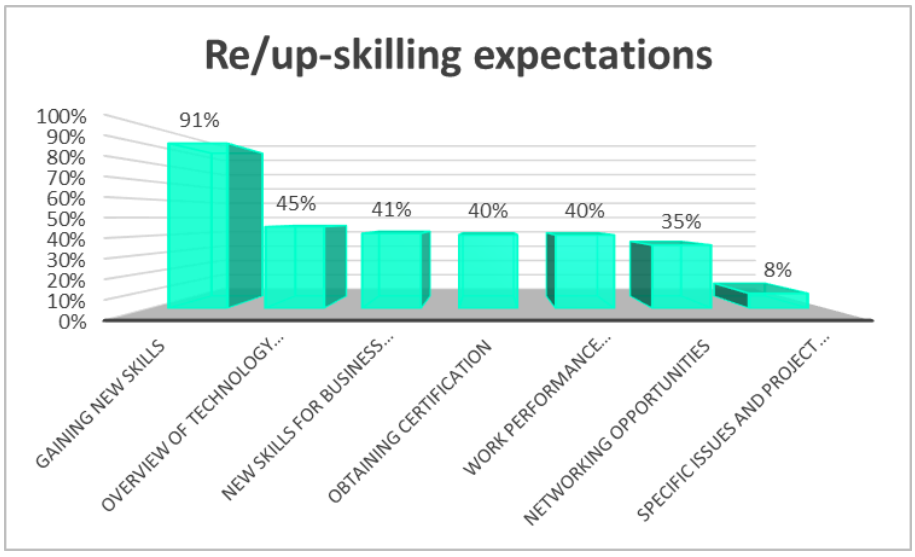
For logical reasons, a school/university course is the preferred type of program, followed by online training and self-directed online learning. Among graduate students, there is also significant interest in learning through workshops.

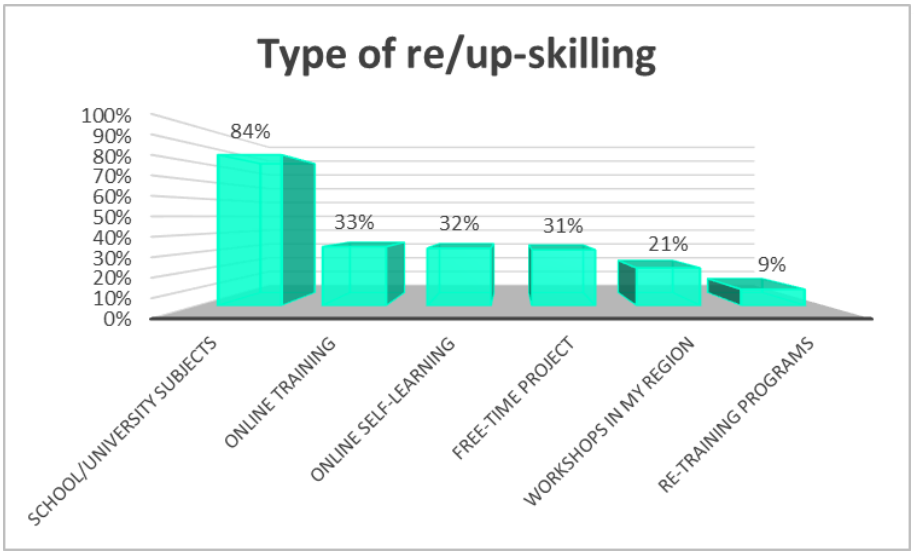
Bachelor's degree students

Following figures summarize the results for bachelor's degree students.


Thinking about re/up-skilling?
Yes
No
Maybe
40%
47%
13%


Motivation for re/up-skilling
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
72%
59%
35%
32%
EXPANSION OF EXPERIENCE
CAREER ADVANCEMENT
COMPLEMENTING MY CURRENT SKILLS
EMPLOYER REQUIREMENTS WHEN APPLYING FOR A JOB


Re/up-skilling expectations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
91%
45%
41%
40%
40%
35%
8%
GAINING NEW SKILLS
OVERVIEW OF TECHNOLOGY...
NEW SKILLS FOR BUSINESS...
OBTAINING CERTIFICATION
WORK PERFORMANCE...
NETWORKING OPPORTUNITIES
SPECIFIC ISSUES AND PROJECT ...



Specific conclusions drawn from the results in the graphs above:

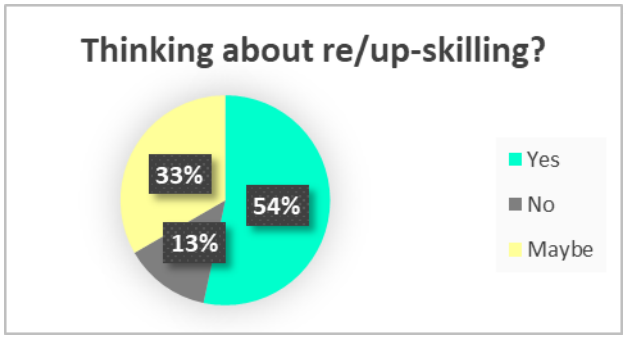
- Only a very small percentage (13%) of participants have no interest in any re/up-skilling program. Among Bachelor's students, nearly half responded positively.
- The main motivation for participating in re/up-skilling programs would be the prospect of expanding existing experience and potential career advancement.
- In terms of expectations from these programs, the top priority is the prospect of acquiring new skills in digital manufacturing technologies. Only a very small percentage of participants see a need to use the acquired knowledge and skills for a specific project.
- For fairly logical reasons, Bachelor's students prefer acquiring new skills within university courses. The lowest preference is for retraining programs (such as those offered by employment offices).

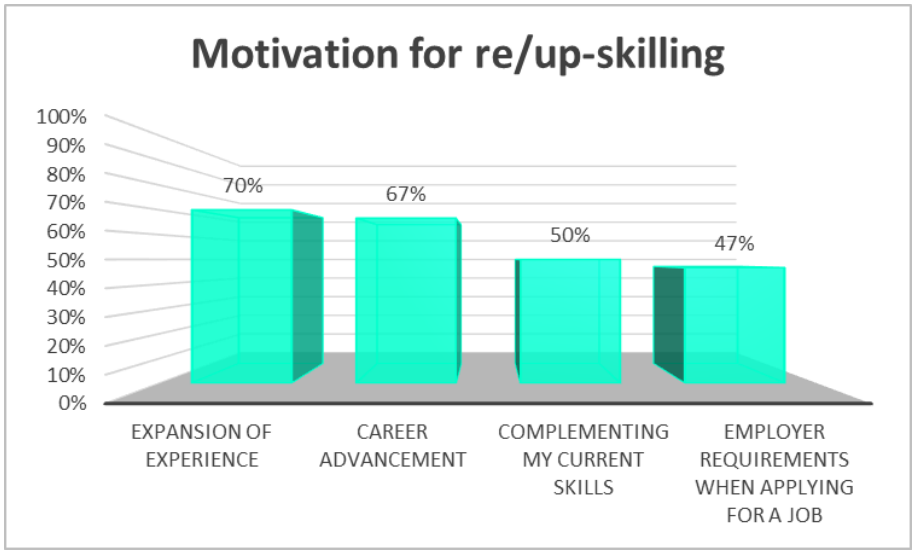
Additional results, which are not presented in graph form and focus on preferences regarding the planned pilot programs, show the following conclusions:

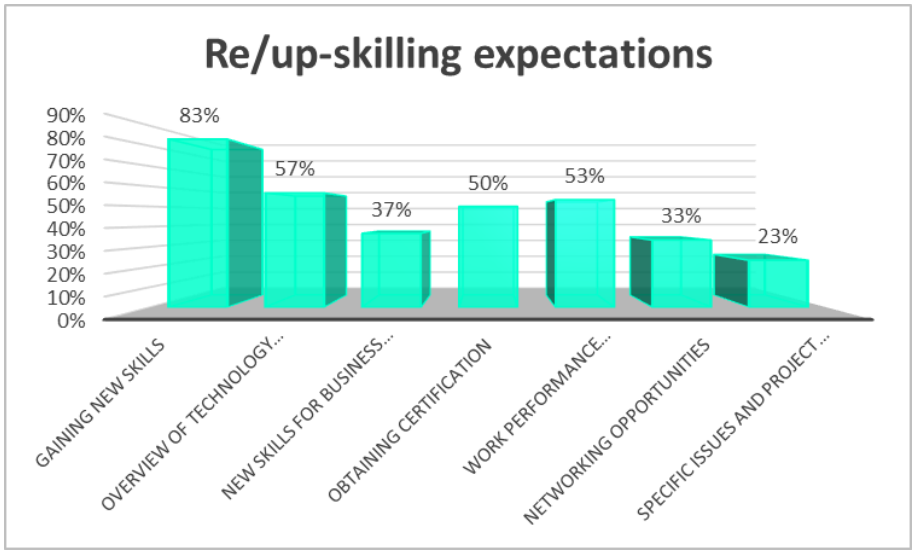
- There is a clear preference for in-person workshops (65 %), or alternatively, in a hybrid format (45 %). The online format is not highly preferred (20 %).
- Participants prefer weekday scheduling (35%) or will base their decision on specific circumstances (39%) to determine their availability for the pilot program.
- The main barriers to participating in the program could be time demands (79%) or program cost (65%).

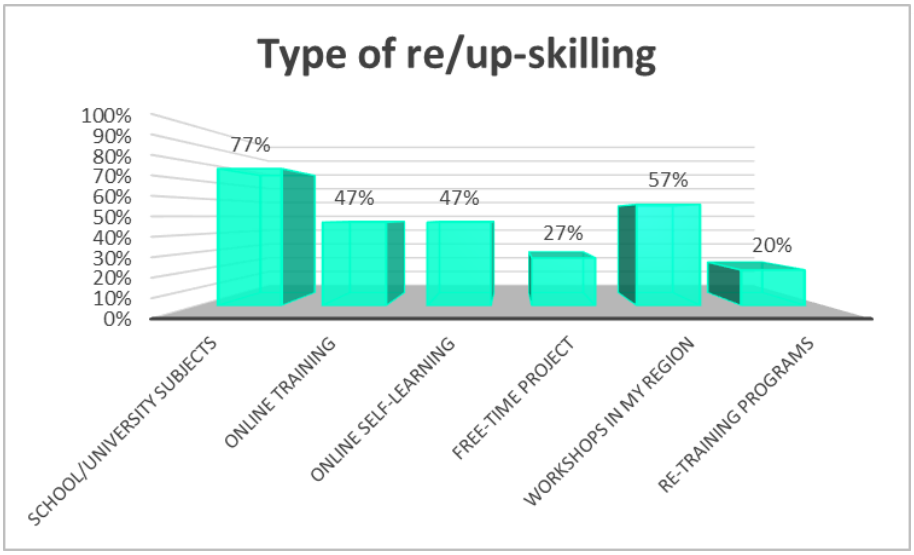
Master's degree students

Following figures summarize the results for Master's students.


Thinking about re/up-skilling?
33%
54%
13%
Yes
No
Maybe


Motivation for re/up-skilling
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
70%
67%
50%
47%
EXPANSION OF EXPERIENCE
CAREER ADVANCEMENT
COMPLEMENTING MY CURRENT SKILLS
EMPLOYER REQUIREMENTS WHEN APPLYING FOR A JOB


Re/up-skilling expectations
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
83%
57%
37%
50%
53%
33%
23%
GAINING NEW SKILLS
OVERVIEW OF TECHNOLOGY...
NEW SKILLS FOR BUSINESS...
OBTAINING CERTIFICATION
WORK PERFORMANCE...
NETWORKING OPPORTUNITIES
SPECIFIC ISSUES AND PROJECT ...



Specific conclusions drawn from the results in the graphs above:

- Interest in potential re/up-skilling programs is even higher among Master's students (54 %) than among Bachelor's students.
- The motivation for participating in such a program is similar (expanding existing experience, potential career advancement), but there is a significantly higher expectation of digital skill requirements from employers.
- In terms of expectations from re/up-skilling programs, the most common is the expectation of gaining new skills, followed by an overview of new technologies or increased job performance due to new skills.
- As with Bachelor's students, the highest preference for re/up-skilling programs is for courses within university studies. However, there is also a relatively strong preference for extracurricular workshops.

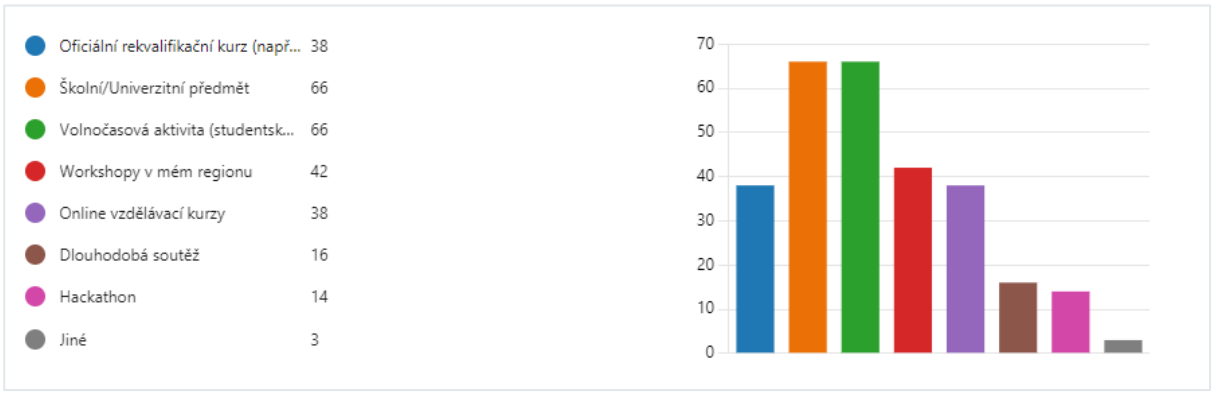
Additional results, which are not presented in graph form and focus on preferences for the planned pilot programs, show the following conclusions:

- Similar preferences for in-person workshops (63 %) and hybrid workshops (60 %) over online format (27 %).
- Commitment to participate in a pilot program is even more dependent on specific circumstances (53 %), with a preference among Master's students for evening sessions (27 %) rather than weekdays (13 %).
- Compared to Bachelor's students, the main barriers are slightly different, with the primary barrier being program cost (83%), followed by location (77%) and time demands (73%).

2. PP2 – FL Brno

Preferred Program Types:

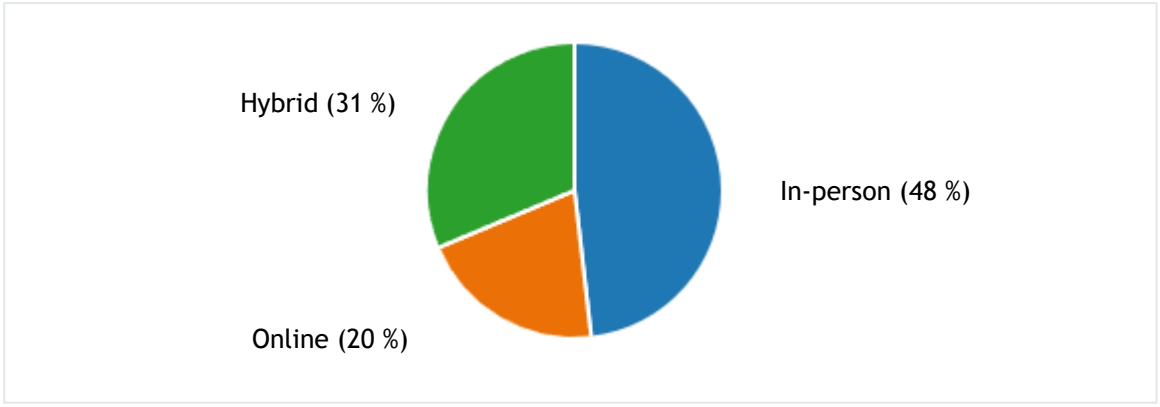
The most popular choices include extracurricular activities (e.g., clubs or student teams) and workshops held in local regions. Some respondents also showed interest in online educational courses, indicating a preference for flexible learning options.



Also 76 out of 129 respondents want the program to be Mon – Fri only 5 out of 129 would participate during the weekends.

Preferred Learning Formats:

Most participants prefer in-person and hybrid courses (a combination of in-person and online learning). This suggests a strong demand for practical, hands-on training, balanced with the flexibility of online components.



Barriers to Participation:

Key barriers include location/accessibility and program costs, with several respondents concerned about the time commitment and availability of programs in their area. Addressing these barriers through flexible scheduling and affordable or subsidized programs could increase participation. These insights indicate a clear need for accessible, practical training programs that focus on digital fabrication skills. Hybrid and hands-on formats are highly preferred, with a focus on real-world applications to prepare participants for the labor market.

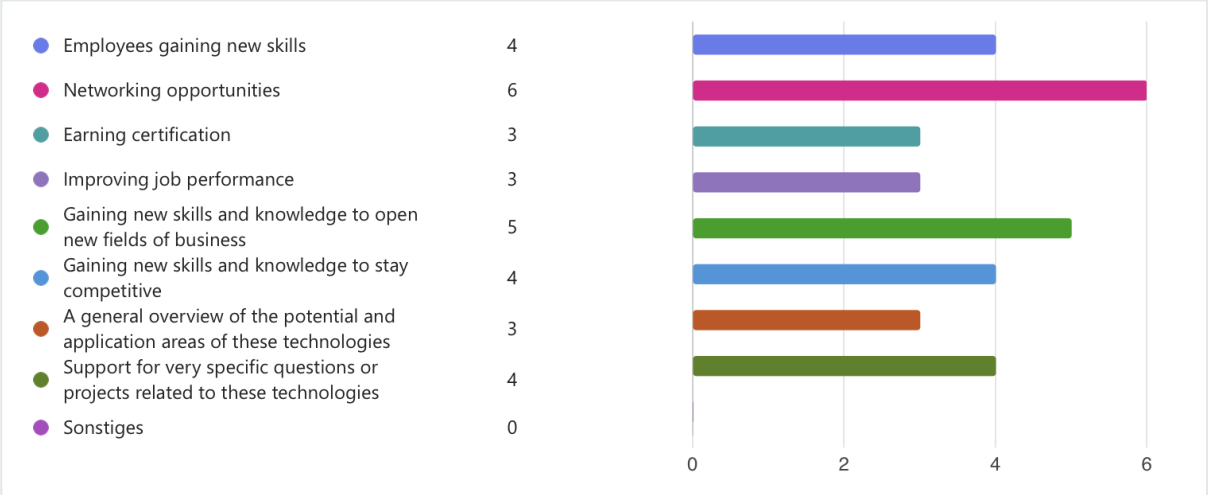
3. PP3 – HappyLab

While our survey explored delivery preferences for training (48% preferring in-person classes, 31% hybrid format, and 18% online learning), these preferences will not impact the program design. The training will be fully integrated into the existing apprenticeship framework of the partner organizations, with sessions conducted during regular work hours on weekdays.

4. PP4 – Brigk

All companies see the need to evolve and are willing to send their employees to upskilling programs. This matched with a 100% rate of them.

Motivations are most likely the same but networking is one strong is this. Off the record upskilling the employees is a form of binding to the company for many employers. Getting certificated is obligatory for most.



In-person group trainings are the most preferred type of education in another place then the firm.

Workshop series and in best case project-based cases are wished.

Online trainings are an option, especially when added as follow ups for a series of workshops combined with in-person trainings.

38% prefer three to four-hour workshops, 50% go for whole days. Working hours are the widely wished option among both interviewed groups. The wished duration for workshop series is very different between a maximum of one month up to half a year. Comments on this question was, that it depends on the topic.

60% of the companies are open to cross-collaboration workshops with other companies. Overall, they are also open to a wide range of attendees as long as they are interested in the provided topic.

About 60% are open to self-taught experts to hold workshops.

Most mentioned barriers for upskilling programs are costs (50%) and time commitment (40%).

5. PP5 – NOI

The surveyed businesses were able to specify concrete support measures by:

- Selecting the technological field.
- Defining the form of the training measure.
- Indicating preferences regarding weekdays.
- Specifying the duration of the sessions.
- Indicating the time concentration of the training.

Additionally, they could specify whether the measure should provide a general overview of the technological field or focus on specific content, with predefined topics for each technological field.

In total, **the 216 businesses expressed 244 preferences for training measures**.

The desired technological fields for specific support measures naturally align broadly with the general indications provided by the businesses. In descending order, these are:

- **Use of Robots**
- **Use of Artificial Intelligence**
- **CAD/CAE**
- **Use of Digital Tools in Traditional Processes**

- **Milling and CAM**

When it comes to the specific design regarding form and time, it should first be noted that the category "it doesn't matter, it depends" was mentioned very often. This suggests that **the stated preferences for the individual dimensions are probably not central** to the decision-making process.

In terms of form, **in-person workshops** dominate.

Regarding weekdays, **weekdays** are clearly preferred.

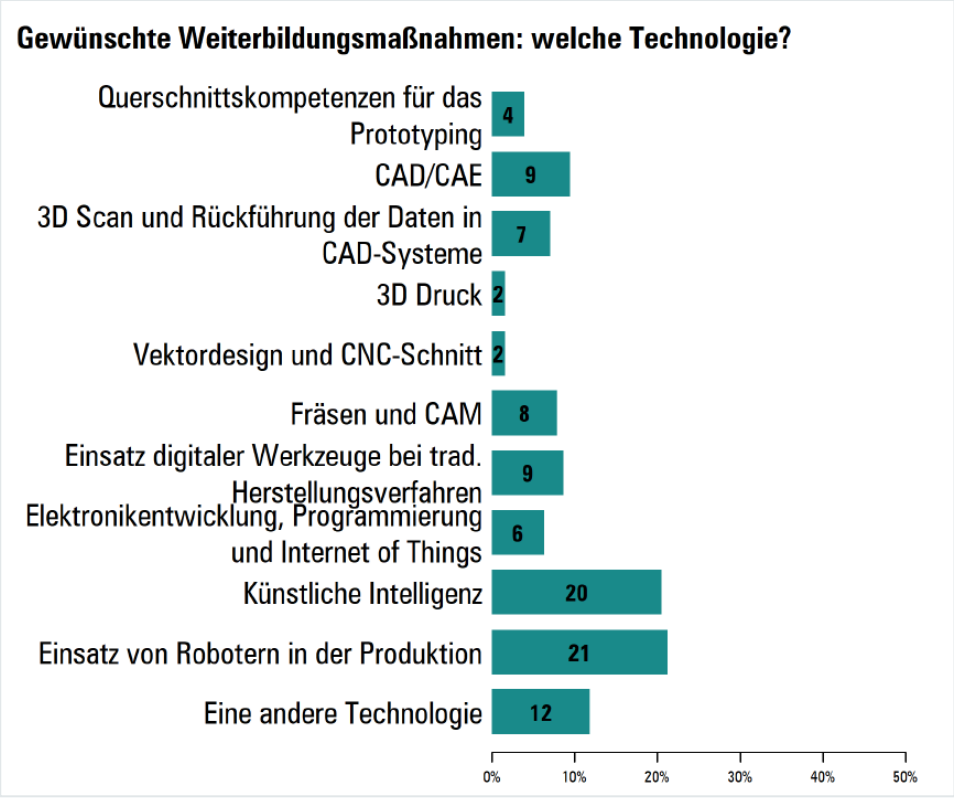
For duration, **half-day sessions** are favored.

In terms of time distribution, **more concentrated events** (within a maximum of 2 weeks) are preferred.

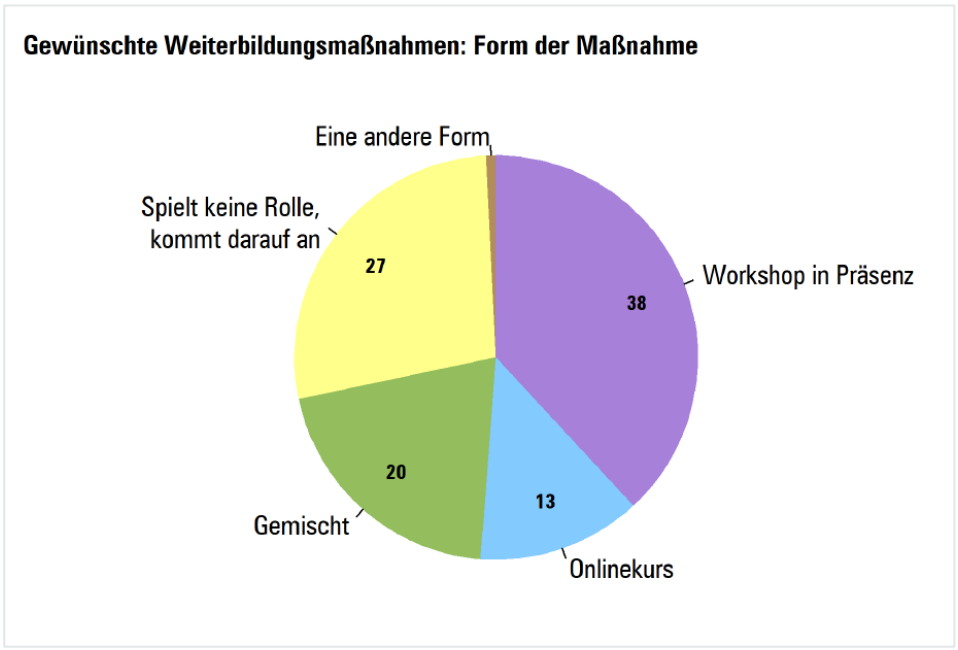
Regarding the content expectations for the measures described, there is an equal **demand for both a general overview and specific in-depth** content.

Contrary to expectations, there is **no clear correlation with company size**: even larger businesses often need a general overview of a technological field.

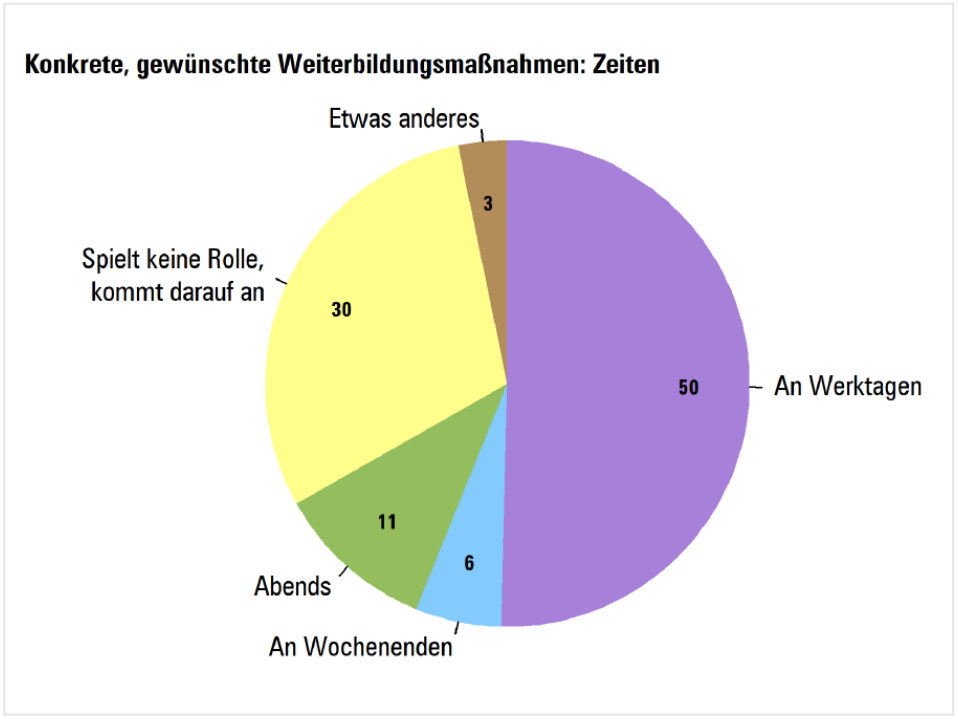
However, differences emerge concerning technological fields. **Specific content is more frequently desired for technologies such as milling and CAM, electronics development, and the use of digital tools in traditional manufacturing processes.**



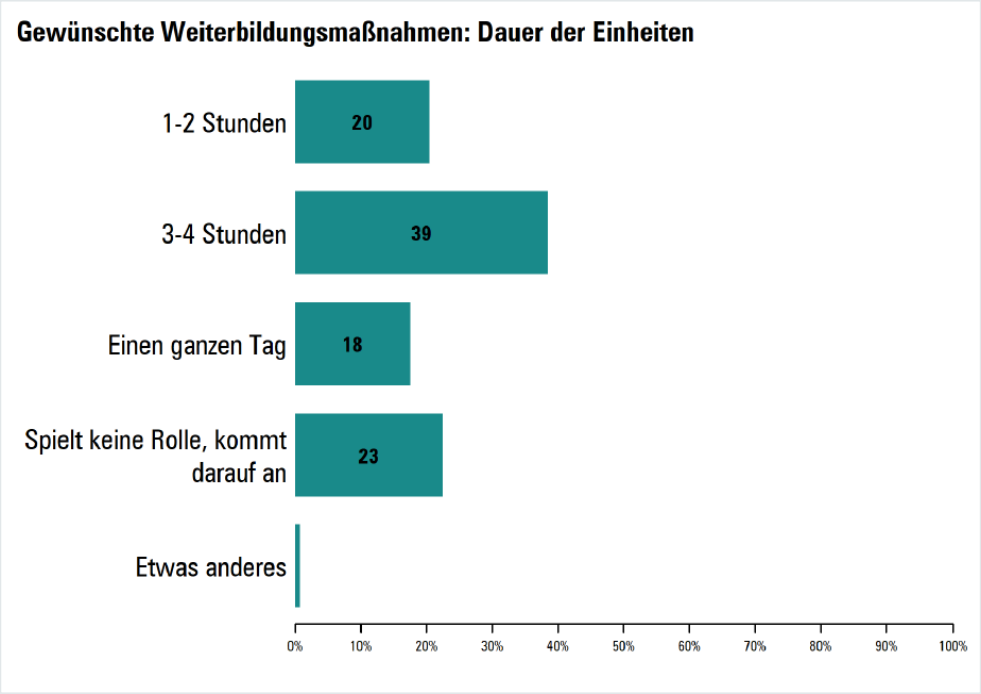
Desired training measures: which technology?; Cross-functional skills for prototyping (4%); CAD/CAE (9%); 3D scan and data feedback into CAD systems (7%); 3D printing (2%); Vector design and CNC cutting (2%); Milling and CAM (8%); Use of digital tools in traditional manufacturing processes (9%); Electronics development, programming and Internet of Things (6%); Artificial intelligence (20%); Use of robots in production (21%); Other technology (12%)



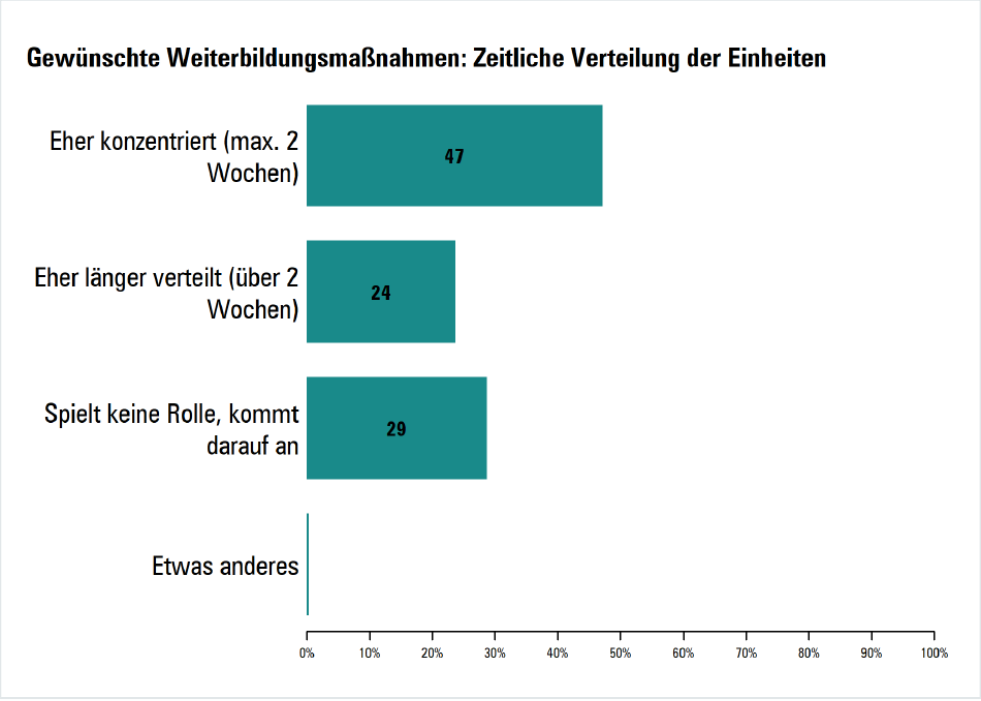
Desired training measures: form of the measure; Other form (1%); It doesn't matter, it depends (27%); Face-to-face workshop (38%); Mixed (20%); Online course (13%)



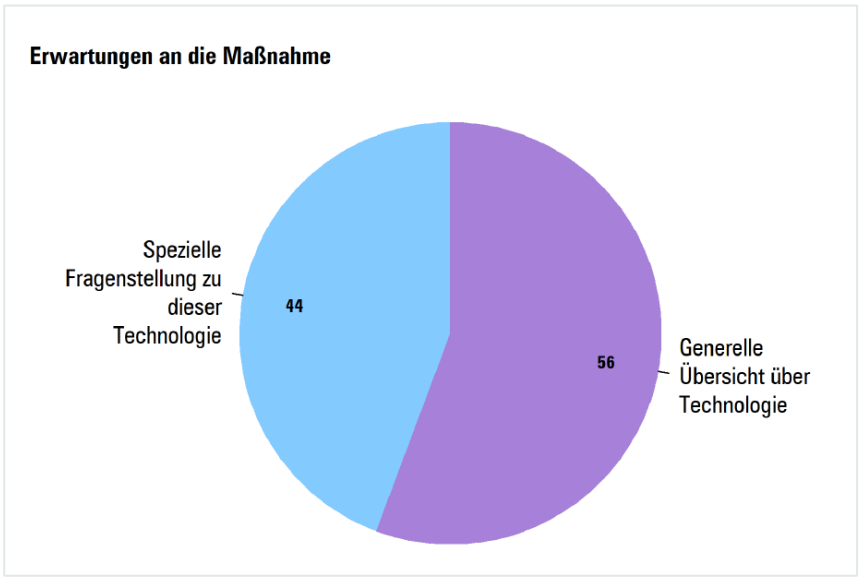
Specific desired training measures: times; Something else (3%); It doesn't matter, it depends (30%); On weekdays (50%); Evenings (11%); Weekends (6%)



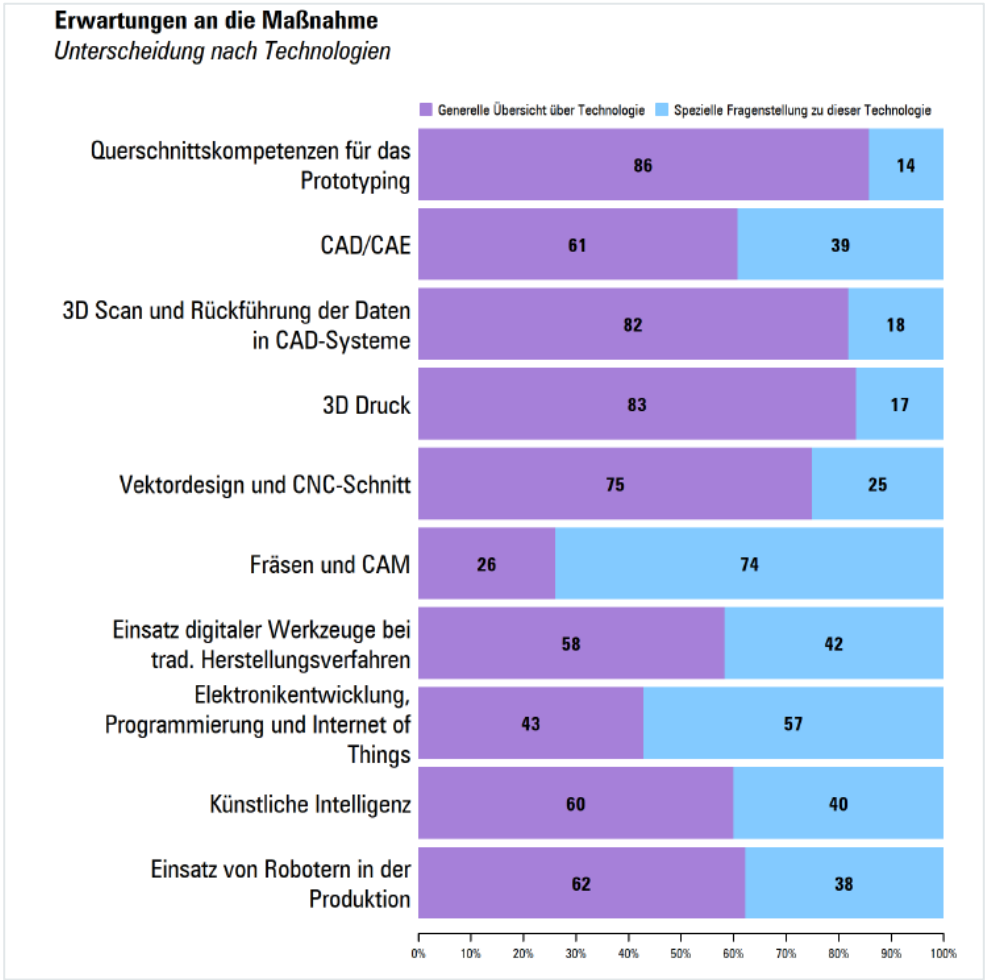
Desired training measures: duration of the units; 1-2 hours (20%); 3-4 hours (39%); One whole day (18%); It doesn't matter, it depends (23%); Something else (1%)



Desired training measures: Time distribution of the units; Rather concentrated (max 2 weeks) (47%); Rather longer distributed (over 2 weeks) (24%); It doesn't matter, it depends (29%); Something else (1%)



Expectations for the measure; Specific question about this technology (44%); General overview of technology (56%)

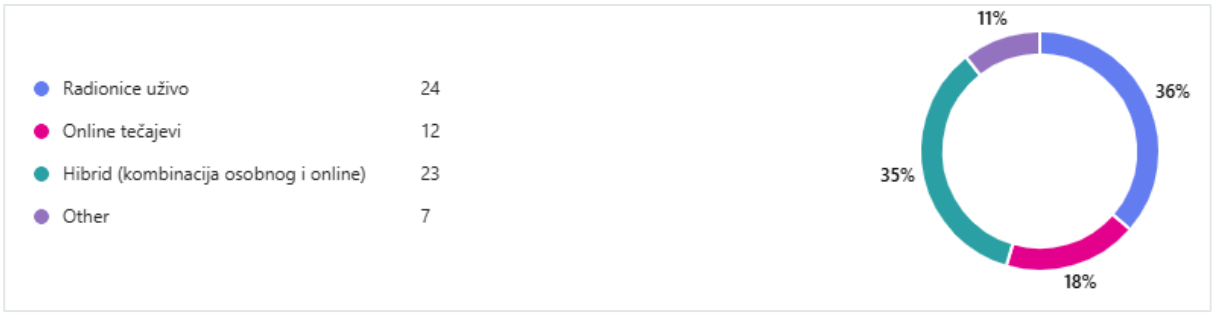


Expectations for the measure; Differentiation by technology; General overview of technology; Specific question about this technology; Cross-functional skills for prototyping (86%; 14%); CAD/CAE (81%; 19%); 3D scan and data feedback into CAD systems (82%; 18%); 3D printing (83%; 17%); Vector design and CNC cutting (75%; 25%); Milling and CAM (26%; 74%); Use of digital tools in traditional manufacturing

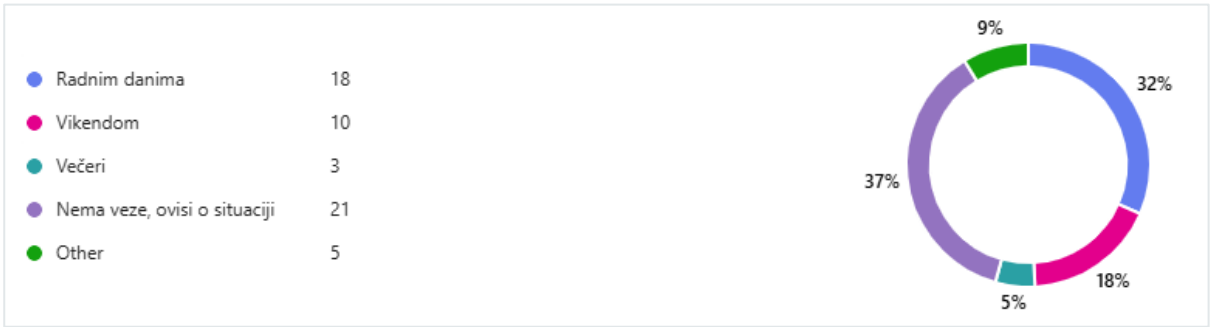
processes, electronics development, programming and Internet of Things (58%; 42%); Artificial intelligence (60%; 40%); Use of robots in production (62%; 38%)

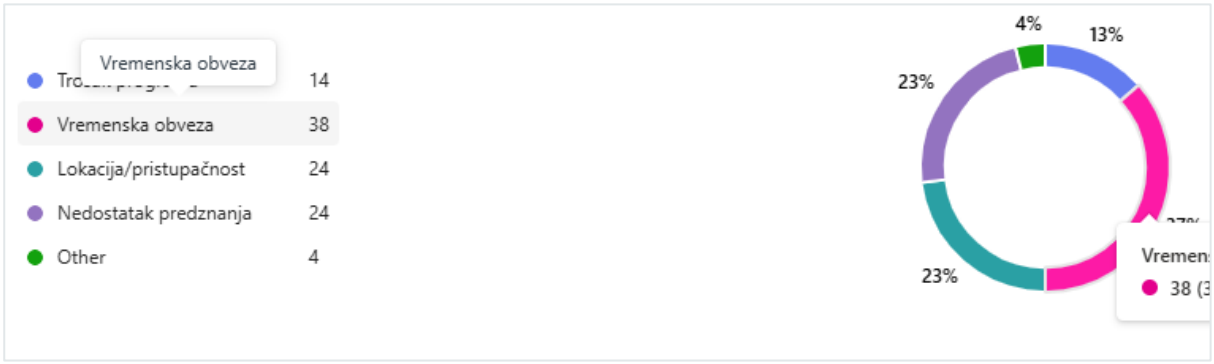
6. PP6 – FabLab Zagreb

Respondents expressed flexible preferences regarding the structure of future digital manufacturing programs, with many indicating that the timing (e.g., weekends) or format (based on circumstances) would be acceptable. However, several potential barriers to participation were highlighted, including lack of prior knowledge, time constraints, and location/accessibility issues. Some respondents also cited budget concerns as a potential obstacle.



These findings suggest a need for programs that accommodate diverse schedules, offer foundational training to address knowledge gaps, and are accessible both in location and affordability. Flexibility in scheduling, such as weekend or hybrid options, could enhance participation among this target group.





F. Implications for project

1. LP1 – BUT

The survey results indicate that master's students have more than twice the experience in digital manufacturing compared to bachelor's students, with master's students showing a preference for more advanced aspects of the field beyond basic device operation. Both groups have the most experience with CAD design and 3D printing, though the proficiency levels differ significantly. Among master's students, 53% report advanced skills in 3D printing (versus 12% for bachelor's), and 80% in CAD design (versus 52% for bachelor's). Experience levels also increase across other areas, except for CNC machining, where the difference is minimal. Student preferences for digital manufacturing skills vary by study level: bachelor's favour CAD design and 3D printing, while master's students prioritize electronics, IoT, laser cutting, robotics, and automation. Students also expressed a strong interest in gaining new skills and insights into emerging technologies, with a preference for in-person or hybrid program formats.

To align with students' preferences, the re/up-skilling programs will be integrated into existing or new courses, thus making them free for students and removing a major barrier to participation. Pilot programs will be structured as hands-on workshops that emphasize the practical application of digital manufacturing skills, with advanced topics included for master's students. Additionally, for bachelor's, there will be a focus on developing soft skills, where they have less experience compared to master's students.

2. PP2 – FL Brno

The survey results reveal that high school students primarily lack practical skills in digital fabrication technologies such as 3D printing, CNC machining, and CAD design. Most participants are interested in reskilling or upskilling programs to prepare for future careers, preferring hands-on workshops or hybrid courses that combine in-person and online learning. Key motivations include career advancement and complementing existing skills. However, barriers like program cost and location/accessibility were noted, suggesting that affordable and flexible programs will be crucial to ensure broader participation.

Since these are activities for high school students, the programs will be designed to be free for participants. Considering the target group (85 out of 129 respondents), this is a must have. At the same time, the survey shows that the program can be conducted in different ways, and in the pilot run we will want to devote ourselves to testing several types of programs - one longer-term and one shorter-term, so that concerns about the time commitment (89 out of 129 respondents) do not deter a larger number of participants.

3. PP3 – HappyLab

The survey reveals that apprentices from our partner organizations "Jugend am Werk" and "Wiener Linien" lack practical skills in various digital fabrication technologies, including 3D printing and scanning, laser cutting, CNC machining, CAD design, electronics, and robotics. A significant majority of participants (77%) expressed interest in or would consider joining a reskilling or upskilling program. Their primary motivations include "widening their experiences" and gaining "opportunities for career advancement." Participants also noted that the program would be "complementary to their current skills."

Our planned activities will be closely coordinated with the partner organizations and co-designed to meet their formal organizational requirements. Given the significant knowledge gap in digital fabrication revealed by the survey, our goals are twofold:

1. Provide participants with a comprehensive overview of the mentioned digital fabrication technologies.
2. Design a workshop format that effectively combines the key technologies identified in this survey.

4. PP4 – Brigk

The process of interviewing will be continued by us until the end of the year to get more data. In addition, the personal contact to companies gains commitment in a later participation of the developed programs.

The survey is redesigned for an additional online survey and is enrolled.

In an upcoming event in the mid of November DiSTT will be presented to a large group of SMEs with a workshop and live survey.

The new data will be implemented into the workshop design in an ongoing process.

As the results are supported by a lot of off record talks to the target group along the way the following conclusions will be implemented in the workshop design:

- Project based: real or abstract use cases along problem solution or product cycle
- Modularity: trainings that can stand on their own and can be merged into a whole series
- Digitalization: digital fabrication methods embedded into and used as vehicle to reach a wider target group and gain commitment
- Soft skill evolvement: building a mindset to gain commitment among employees
- Flexibility: training should be adjustable or suitable for different level of skills

Building up the program on a practically oriented reference should lead to a high acceptance, as some employers mentioned that commitment to change and evolvement are the main barriers to bring employees further. Taking fear out of digitalization in common and giving practical examples for an adaptive way of working should be included into the workshop design.

5. PP5 – NOI

Planning support measures for businesses in the field of digital production technologies is a task that must consider various dimensions. Although the DiSTT project defines employee training as a key measure, it is clear that businesses can also be supported in other ways.

Support in applying for funding is considered useful by many businesses, especially smaller ones.

Specific business consultations are also seen as beneficial by a significant majority of businesses, particularly larger ones.

Support measures for businesses can generally be categorized into six fields:

1. Qualification and Further Training: Employees of the businesses receive further training, bringing new knowledge and skills into the company.

2. Consulting: Businesses are supported by external experts.
3. Networking: Businesses exchange information and collaborate with other businesses, suppliers, or service providers.
4. Cooperation: Businesses work with other organizations to undertake joint activities, develop common products, or similar initiatives.
5. Visibility: Businesses gain higher visibility, which strengthens their position in the market and the labor market.
6. Financial Support: Businesses receive direct or indirect financial assistance.

When considering the depth of content that a training measure should aim for, it must **be taken into account that there are both pioneers and laggards in the use of a technology**. Both groups should be catered to.

Every specific need assessment must address the extent to which potential beneficiaries understand the specific terminology of a technology and can assess its usefulness for themselves. Given this and the high proportion of businesses that want an overview of a technology, it **is important to develop low-threshold offerings alongside specific training programs**. These offerings should help businesses understand **what a technology is about and where its potential lies** for their operations.

Overall, the responses from businesses indicate that the DiSTT project, with its focus on digital production technologies and training as a support measure, is on the right track. When selecting technologies for training measures, there is a challenge due to the lack of economies of scale, as certain technologies are only relevant to a few businesses. Therefore, the measures must be well-promoted. Collaboration with existing training institutions and associations is crucial for success.

Considering the issues of small sample sizes, **initial measures will be developed in the well-established fields of CAD/CAE and milling/CAM, as well as in the newer fields of robotics and AI, where relatively many businesses have shown interest**. In addition to content, formal aspects such as timing and training format were also captured in the design of training offerings. **The distribution of preferences should be noted, although these aspects are probably not central to the decision** of whether a business sends someone to training or not.

6. PP6 – FabLab Zagreb

The survey results highlight that individuals from less privileged backgrounds face several barriers to accessing digital manufacturing skills, including a lack of foundational knowledge, budget constraints, and accessibility issues. While interest in upskilling and reskilling is high, with participants motivated by career advancement and personal growth, practical knowledge in areas like 3D printing, CNC machining, and CAD design remains limited. Preferences lean toward hands-on, workshop-style training or hybrid formats that accommodate diverse schedules and provide a blend of in-person and online learning.

To address these needs, project activities will focus on offering foundational courses that are accessible and affordable. Given the financial barriers identified, we will aim to provide these programs free of charge. Additionally, we will explore flexible formats, including shorter-term and weekend-based options, to better suit participants' time constraints. The pilot phase will include testing various program structures to identify the most effective formats for broader accessibility and engagement within this target group.

G. Summary per partner

1. LP1 - BUT

The Brno University of Technology survey, conducted from September 30 to October 14, 2024, gathered responses from 139 students at the Faculty of Mechanical Engineering. The respondents included 109 undergraduates and 30 master's students, with 14 % female representation. Key findings indicate a disparity in digital manufacturing experience between bachelor's and master's students, with master's students showing more advanced skills and preferences for complex areas such as electronics, IoT, and robotics. Bachelor's students displayed strong interest in foundational skills like CAD design and 3D printing, which align with their stage of study. Both groups expressed a need for re/up-skilling opportunities, favouring in-person or hybrid formats, with cost and time as the main barriers. Consequently, project activities will incorporate these preferences by offering hands-on workshops integrated into courses, prioritizing particular skills for bachelor's and master's students to match their different levels of expertise and experience.

2. PP2 - FL Brno

The FabLab Brno survey targeted high school students to assess their skills, interests, and needs in digital fabrication. With 129 participants, primarily under 18 and evenly split by gender, the survey revealed that while 39% have some experience in digital manufacturing, this is mainly school-based. They possess basic CAD, 3D printing, and CNC skills, but have significant gaps in technical areas like machine maintenance and advanced software usage, as well as soft skills such as confidence in public speaking. Notably, 38 respondents expressed interest in further training, with 68 more indicating potential interest. They prioritize hands-on, practical learning formats alongside flexible options, with a preference for weekday sessions over weekends. Barriers include cost, location, and time commitment, highlighting a need for accessible, affordable, hybrid training programs focused on practical application to enhance employability and career opportunities.

3. PP3 - HappyLab

A survey by Happylab, in collaboration with Jugend am Werk and Wiener Linien, gathered 82 apprentice responses, revealing significant digital skill gaps in areas like 3D printing, scanning, laser cutting, CNC machining, CAD design, electronics, and robotics. Most respondents rated their digital fabrication knowledge as low, with 71% lacking prior experience. Key skills sought included machine maintenance, CAD design, 3D scanning, and IoT, with 77% expressing interest in reskilling opportunities driven by career advancement goals. The survey underscored soft skill deficiencies, especially in public speaking. Happylab's training will integrate within apprentices' work schedules, focusing on hands-on workshops tailored to bridge these skill gaps.

4. PP4 - Brigk

To better understand digital skill gaps, brigk conducted personal interviews with 29 respondents from eight SMEs, prioritizing this approach over online-only surveys due to historically low response rates. These high-

quality interactions, largely with company owners and employees, highlighted significant demand for skills in 3D printing, 3D scanning, CAD, AI, and data science. Although most firms rate their current employee skills positively, they aim to expand digital capabilities, particularly in 3D printing and AI, to enhance flexibility and efficiency. Employers expressed a preference for project-based, in-person, modular workshops that fit into existing work schedules, with a focus on practical applications and soft skill development for improved commitment. Cost and time constraints emerged as key barriers. The ongoing survey process, with a new online component, will continue through the end of the year, with data supporting the flexible, skill-level-adjustable workshop designs that brigk plans to implement.

5. PP5 - NOI

The DiSTT project's survey, conducted in collaboration with professional company and local stakeholders, assessed digital production technology needs in South Tyrol's manufacturing sector. Targeting companies with 8+ employees in production sectors, the study covered current technology use, support needs, and skills gaps. Key findings showed a need for training in more established digital technologies such as CAD/CAE and CAM and some more cutting-edge ones, mainly robotics, and AI. About 216 companies participated, with a high response rate compared to the number of companies contacted. This strong interest in digital skills support can also be seen in the number of companies that left their contacts during the survey, interested in participating in future support measures in these fields. Preferred training formats included in-person workshops, half-day sessions, and a mix of general and specific technical content. Additionally, businesses value expert consulting, funding support, and networking, highlighting these as potential support strategies for advancing digital capabilities.

6. PP6 - FL Zagreb

FabLab Zagreb conducted an internal survey to assess digital manufacturing skills and training preferences among 57 respondents from less privileged backgrounds. Most respondents (81%) lacked experience with digital manufacturing, with limited exposure to technologies like 3D printing, CNC machining, and CAD. Despite these skill gaps, there was strong interest in reskilling for career growth and personal development. Respondents preferred interactive, hands-on training (especially workshops), and flexible scheduling, including hybrid and weekend options. Financial constraints, time availability, and accessibility were cited as major barriers. In response, project activities will emphasize foundational courses, free programs, and flexible formats, piloting various structures to maximize accessibility and

H. Global Summary

The survey results across various project partners underscore the evolving digital skill needs within Central Europe's labour market, particularly in fields like digital manufacturing and advanced technology. Respondents from diverse backgrounds—including university students, high school students, apprentices, SMEs, and underprivileged communities—demonstrate widespread demand for training in essential areas like CAD design, 3D printing, and robotics, as well as emerging fields such as AI and IoT.

The data highlights gaps in technical and soft skills, with each group favouring hands-on, accessible training formats tailored to their schedules and budgets. University students at Brno University of Technology (BUT) prioritize foundational and advanced skills depending on their study level. Study shows master's students prefer to improve in advanced digital areas like electronics, IoT, and robotics, while bachelor's students focus on foundational skills such as CAD, both preferring hybrid or in-person training to address cost and

time barriers (BUT). High school students surveyed by FabLab Brno seek affordable, practical learning options to enhance employability, especially during weekdays. Apprentices surveyed by HappyLab, largely new to digital manufacturing, emphasize reskilling needs, focusing on career growth. Brigk's SME interviews reveal a demand for 3D printing and AI to boost flexibility and efficiency, with employers favouring modular, in-person, project-based workshops. In South Tyrol, NOI's survey highlights companies' interest in CAD, CAM, and robotics, with a preference for in-person workshops and expert consulting to support skill advancement. Finally, underserved groups surveyed by FabLab Zagreb emphasize accessible, flexible training to acquire foundational digital skills, ensuring inclusivity in workforce development.