



DEEP

Disability and professional Empowerment Engaging 3d Printing

Grant Agreement number:
2021-1-IT01-KA220-VET-000034658

REPORT ON IMPLEMENTATION (R3)



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[Go to index](#)

INDEX

INDEX	2
Introduction.....	1
1. DEEP implementation in Czech Republic	3
1.1. Local training.....	3
1.1.1. Stakeholders involved	3
1.1.2. Content of the training	4
1.1.3. Evaluation and feedback	8
1.1.4. Recommendations and lessons learnt	21
1.2 Follow-up meetings.....	22
1.2.1. Context and methodology	22
1.2.2. Discussions and feedback gathered	23
1.2.3. Results and lessons learnt.....	25
1.3. Supervision meetings	25
1.3.1. Context and methodology	25
1.3.2. Outcomes and results	26
1.3.3. Next steps and lessons learnt	27
1.4. Laboratory activities	27
1.4.1. Requests and needs addressed	27
1.4.2. Activities performed	29
1.4.3. Results and lessons learnt.....	30
2. DEEP implementation in Italy.....	31
2.1. Local training.....	31
2.1.1. Stakeholders involved	31
2.1.2. Content of the training	32
2.1.3. Evaluation and feedback	39
2.1.4. Recommendations and lessons learnt	47
2.2 Follow-up meetings.....	47



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INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

2.2.1. Context and methodology	47
2.2.2. Discussions and feedback gathered	49
2.2.3. Results and lessons learnt.....	53
2.3. Supervision meetings	54
2.3.1. Context and methodology	54
2.3.2. Outcomes and results	56
2.3.3. Next steps and lessons learnt	58
2.4. Laboratory activities	59
2.4.1. Requests and needs addressed	59
2.4.2. Activities performed	60
2.4.3. Results and lessons learnt.....	62
3. DEEP implementation in Luxembourg and France	66
3.1. Local pilot training	66
3.1.1. Stakeholders involved	66
3.1.2. Content of the training	68
3.1.3. Evaluation and feedback	71
3.1.4. Recommendations and lessons learnt	78
3.2 Follow-up meetings.....	79
3.2.1. Context and methodology	79
3.2.2. Discussions and feedback gathered	80
3.2.3. Results and lessons learnt.....	82
3.3. Supervision meetings	83
3.3.1. Context and methodology	83
3.3.2. Outcomes and results	83
3.3.3. Next steps and lessons learnt	84
3.4. Laboratory activities	85
3.4.1. Requests and needs addressed	85
3.4.2. Activities performed	86
3.4.3. Results and lessons learnt.....	89
4. DEEP implementation in Spain	93
4.1. Local training	93
4.1.1. Stakeholders involved	93



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of the European Union



INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

4.1.1. Stakeholders involved	102
4.1.2. Content of the training	102
4.1.3. Evaluation and feedback	107
4.1.4. Recommendations and lessons learnt	112
4.2 Follow-up meetings.....	112
4.2.1. Context and methodology	112
4.2.2. Discussions and feedback gathered	116
4.2.3. Results and lessons learnt.....	117
4.3. Supervision meetings	119
4.4. Laboratory activities	119
Annex: Evaluation questionnaire used for the local trainings.....	120



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of the European Union



[Go to index](#)

Introduction

This report describes the field experimentation of the DEEP model and provides the result of the activities and related evaluations that have been carried out in different countries. Those activities include:

- the realization of pilot training courses involving a total of 233 participants (from a target of 160: about 40 in Italy, 40 in Luxembourg, 40 in Spain and 40 in the Czech Republic) among health professionals, occupational therapists and makers.
- follow-up meetings aimed at further discussions with those multi-actor target groups (at least 30 trainees from each partner). Those meetings with professionals are aimed at assessing the impact that the DEEP model had had on their personal thoughts and feelings in relation with their work with disabled people (what they have learnt, what the DEEP methodology changes for them in their approach and personal satisfaction while doing their job). The methodology chosen for all follow-up meetings is a focus group discussion as focus groups are specifically supportive of qualitative research and suitable for assessing thoughts, opinions and feelings of participants in relation with a specific topic. For the moderation of the discussions, the DEEP partners agreed on a limited number of pre-defined questions that were used by the moderator of the meeting to invite the participants to share their personal opinions. Additional questions could be asked to the group on the fly as needed to further clarify or explore a specific comment.
- supervision meetings aimed at assessing changes in terms of facts and behaviours, what people do and how they do it. They are related to the way in which the professionals relate while dealing with persons with disabilities before and after the training, evaluating the transfer of the learning outcomes in practice. The supervision meetings were organised in each partner country, at healthcare institutions, socio-sanitary organisations or Fab Labs to evaluate the way in which the professionals related during the performance of their work and the services that were offered by them to the end users. The methodology chosen was the one of participatory observation, meaning that



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[Go to index](#)

the DEEP partners performed field visits to some of the trainees and observed the changes in their daily practice (in terms of new activities and behaviours).

- lab activities: those activities are practical workshops with stakeholders involved in the DEEP project (direct and indirect targets). They focus on the co-design of at least one specific customised technical aid with the involvement of the healthcare professionals, patients and makers. The methodology is to review the (unmet) needs of the indirect targets and co-create together some technical solutions, that is to say specific prototypes for customised technical aids that can be 3D printed and supplied to the end user.



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[Go to index](#)

1. DEEP implementation in Czech republic

1.1. Local training

1.1.1. Stakeholders involved

Before the implementation of the pilot courses, Hertin identified entities, institutions and organizations that are part of the project's stakeholders and the participation of their representatives in the course could be beneficial for them:

- Association of highly qualified physiotherapists with various specializations - **Fyzijo.cz**
- Craft incubator association founded by the city of Ostrava - **Fajna dílna**
- Professional center for 3D printing and modelling in Ostrava - **M3D**
- A non-profit society helping people in wheelchairs after spinal cord injury and their families cope with a difficult life situation - **PARAPLE Center**
- University-wide facility providing professional advisory, technical and therapeutic services at all faculties of the University of Ostrava - **PYRAMID CENTER**
- **Faculty of Medicine OSU** (University of Ostrava), field of occupational therapy
- A charitable organization that provides services in the social and health field. It is part of the Silesian Church of the Evangelical Augsburg Confession. Most of the SD centres are located in the Moravian-Silesian Region - **SLEZSKÁ DIACONIE**
- **Center for the disabled in MSK**
- **Charity Ostrava**
- **Ostrava city library department – 3D printing**

The stakeholders were contacted via e-mail, which included an invitation to the course with a description of the content of the pilot course and the dates of the course implementation. A project newsletter with information about the project and pilot courses was a part of these e-mails as well.

In addition, a poster about the pilot courses was published in the premises of the HERTIN training center, on the OSU (University of Ostrava) bulletin board, on the HERTIN website, LinkedIn and Facebook. The poster was also published on a Facebook group for fans of 3D printing. These steps proved to be effective as several participants signed up for the course based on them.

Thanks to these activities, information about the pilot courses and promotion of the DEEP project took place.



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[Go to index](#)

Invitation/poster

Využijte možnost zapojení se do originálního workshopu propojujícího svět osob se zdravotním znevýhodněním se světem 3D tisku.

Co získáte?

- 8 hodin interaktivního školení pod vedením zkušených odborníků ze světa 3D tisku a sociologie
- Nové kontakty a základy modelování ve 3D
- Mezinárodní certifikát o absolvování modelu DEEP

Díky aplikaci vzdělávacího modelu DEEP navíc během kurzu vytvoříte pomůcky pomáhající v každodenním životě zdravotně handicapovanému.

Pro koho je kurz určen?

- Zdravotní profesionály
- Ergoterapeuty
- Fanoušky a odborníky v sektoru 3D tisku
- Studenty příbuzných oborů

Kurzy probíhají **16. 5. 2024 a 25. 5. 2024**
v centru Ostravy od 12:00 - 18:00 hod.
Účast je zcela **ZDARMA**.

Během kurzu bude připraveno **bohaté občerstvení!**

Těšíme se na Vás

Pro více informací navštivte www.hertin.cz
nebo nás kontaktujte na e-mail hana.nevrelova@hertin.cz

Nezávazná přihláška

1.1.2. Content of the training

The DEEP pilot course was conducted across three separate sessions, each spanning two consecutive days, with an 8-hour training duration per day. These sessions were held on distinct dates: May 16th and 25th, June 13th and 14th, and August 30th and September 6th, 2023. All training sessions were hosted at the HERTIN training center, centrally located in Ostrava. A total of 40 participants engaged in the course, comprising 5 physiotherapists, 15 occupational therapists, and 20 individuals specialized in 3D creation.

The content and structure of the course have been carefully created by our experts, with the main source of information being the outputs of the Training of Trainers (ToT) and the methodological guide HANDBOOK. This essential information has been strategically considered with regard to the level of knowledge in the field and the specific level of development of 3D printing in our country. This approach ensured that the course offered content and structure appropriate to the needs of the participants, while reflecting the current state and capabilities of 3D printing in our environment.



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[Go to index](#)

Course content:

Day 1

INTRODUCTION	
Introduction of the project	Basic information about the project - objective, participants, assumptions and implementation, expected outputs, financing.
Introduction of lecturers	Information about the lecturer - who he is, what he does professionally in general, his role in the project, how he is useful for the project and where he sees the project benefiting.
Introduction of participants	In the form of a game, individual participants will present themselves, their work, their role in the project and their expectations from the course.
Recapitulation of the introductory part	Participants will know the direction and means to achieve the course goal and will know their roles.
SOCIAL PART	
Disabled people in society	What disability means (Module I): <ul style="list-style-type: none"> • Definition of disability; • History of the treatment of people with disabilities; • Demographics - World, Europe Types of disability (Module I)
Practical part	Exercise: <ul style="list-style-type: none"> • Boundaries of contact - Which part of my body? • Anti-cards Mood Barometer
TECHNICAL PART	
Theoretical and practical input	The role of 3D printing in the world of people with disabilities <ul style="list-style-type: none"> • Prototyping technology and 3D printing; • Laser cutting and vector graphics; Electronics
Examples of how to help	
Practical part	Participants will be guided through the process of cutting 3D models and preparing printers to turn their ideas into a real product.
Introduction of a specific person	Introduce the person(s) with a disability (mi)
Conclusion of Day 1	End of Day 1 and recap

Day 2

SOCIAL PART	
Introduction to the second day	Welcoming participants to the second day Reminder of tasks

5



	Mood Barometer
Prosociality	How to build trusting relationships with people at some level of disability; Communication styles and their influence on the environment Some indicators of prosocial relationship with patients
TECHNICAL PART	
Combining 3D printing and disability use	Brainwriting on the topic - How to use 3D printing to help The goal is to invent a simple object that would make the disabled person's life easier. For the selection, a sector slide will be produced with criteria such as feasibility, efficiency, production intensity, etc.
Sample of practical implementation	Modelling Programming 3D printing
CONCLUSION	
Evaluation of the course	Final evaluation of the course. Use of evaluation tools according to DEEP HANDBOOK
Evaluation and completion of the course	Final evaluation of the course; Space for course participants; Farewell

Day 1:

The course commenced with an engaging introduction where participants actively engaged in project presentations and mutual introductions. The introductory game enabled participants to present themselves, their roles in the project, and their expectations from the course, creating a friendly atmosphere and laying a solid foundation for future collaboration.

The social part provided DEEPer insights into the issues surrounding individuals with disabilities. Modules focusing on the definition of disabilities, the historical treatment, and demographic statistics established a fundamental understanding. Practical exercises helped participants explore personal boundaries of contact and express their mood using the mood barometer.

In the technical segment, participants underwent theoretical and practical immersion into the world of technology for individuals with disabilities. Topics such as 3D printing, laser cutting, and vector graphics were presented comprehensibly. Practical exercises involving cutting 3D models and preparing printers allowed participants to experience the process of creating tangible products.



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[Go to index](#)

One of the highlights was the presentation of individuals with disabilities. These personal stories offered invaluable insights into the real lives of people with disabilities, serving as inspiration for course participants.

The day ended with a recap and reflection session, providing participants with an opportunity to summarize their acquired knowledge and skills.

Day 2:

The second day began with a warm welcome and a reminder of the previous day's tasks, ensuring continuity in the learning process. Participants again utilized the mood barometer, enabling them to express their feelings and perceptions, which was valuable for monitoring changes and reactions to the ongoing topic.

The social segment focused on developing trustful relationships with individuals with varying degrees of disability. Modules covering communication styles and their impact on the environment provided valuable skills for better interaction with those affected.

The technical part involved an innovative group activity called "Brainwriting" on the use of 3D printing to aid individuals with disabilities. Creating a sectoral slide with selection criteria for ideas was beneficial for structured decision-making. Furthermore, practical demonstrations involving modelling, programming, and 3D printing allowed participants to practically apply the gained knowledge.

The day concluded with a final course evaluation using tools from the DEEP HANDBOOK, allowing for an assessment of the course's quality and constructive feedback from participants. The wrap-up provided space for participants to express their impressions and opinions on the course, offering an opportunity for reflection on the gained knowledge and experiences.



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[Go to index](#)

Photos from the pilot training:



1.1.3. Evaluation and feedback

The participants from the field of occupational therapy demonstrated a profound interest and enthusiasm in exploring the possibilities of utilizing 3D printing to support individuals with disabilities. Their active engagement and involvement in discussions about personalizing aids for individual patients were commendable. They exhibited not only expertise in the field of occupational therapy but also a willingness to explore new technologies and find ways to optimize them for enhancing the lives of people with



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[Go to index](#)

health impairments. Their questions and suggestions showed a DEEP commitment to understanding the specific needs of each patient and adapting technological solutions most efficiently.

On the other hand, participants from the realm of 3D printing brought forth creative and technically sound perspectives on using printing for producing specialized aids. Their knowledge of the technical capabilities of printing and their ability to design and create models tailored to the specific needs of patients were inspirational. Their expertise in 3D printing was evident and contributed to exploring new perspectives for employing these technologies in healthcare and occupational therapy. Their ability to adapt to the needs of occupational therapists and listen to their requirements suggests the potential for successful collaboration in the future for developing and implementing new technological solutions for people with disabilities.

The following paragraphs present the analysis of evaluation questionnaires (ANNEX I from DEEP handbook) from a sample of 15 course participants. The first graph always shows the answers from the pre-test and the second graph shows the answers from the post-test.

THEMATIC AREA: DISABILITY

Assessment of the disability section showed significant progress among participants. Post-course assessments predominantly showed correct responses, indicating significant improvement in understanding and handling of disability concepts. This shift underlines the significant progress in participants' understanding and approach to disability-related issues after completing the course.



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[Go to index](#)

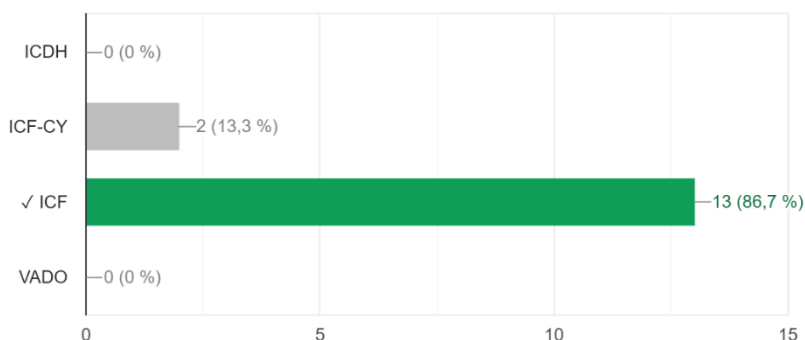
1. What is the main International Classification system on disability?

Správných odpovědí: 6/15



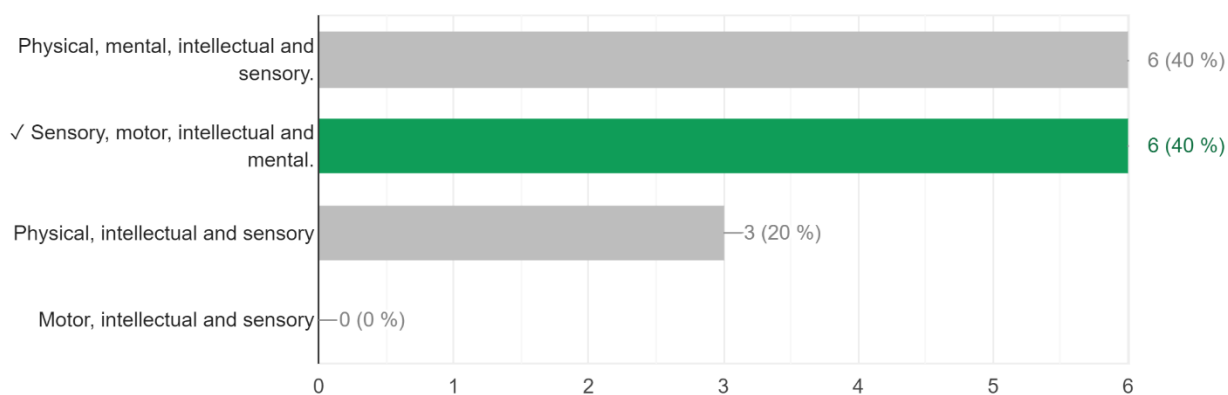
1. What is the main International Classification system on disability?

Správných odpovědí: 13/15



2. How are disabilities categorized?

Správných odpovědí: 6/15





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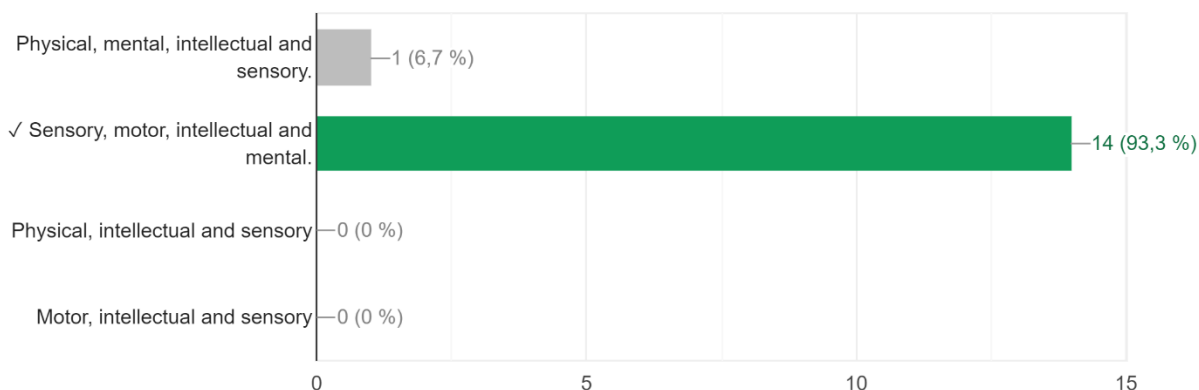


INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

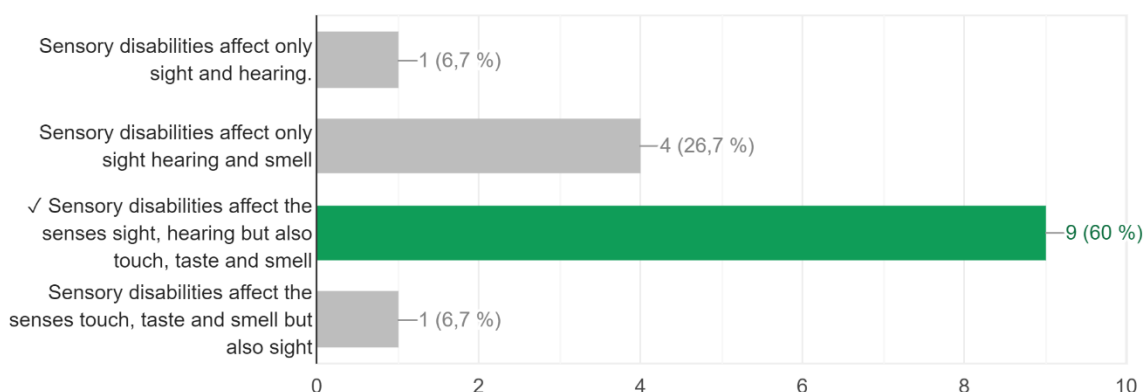
2. How are disabilities categorized?

Správných odpovědí: 14/15



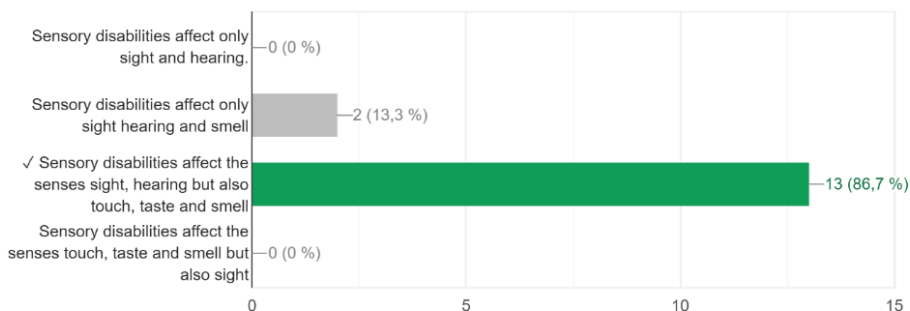
3. Identify the correct statement:

Správných odpovědí: 9/15



3. Identify the correct statement:

Správných odpovědí: 13/15





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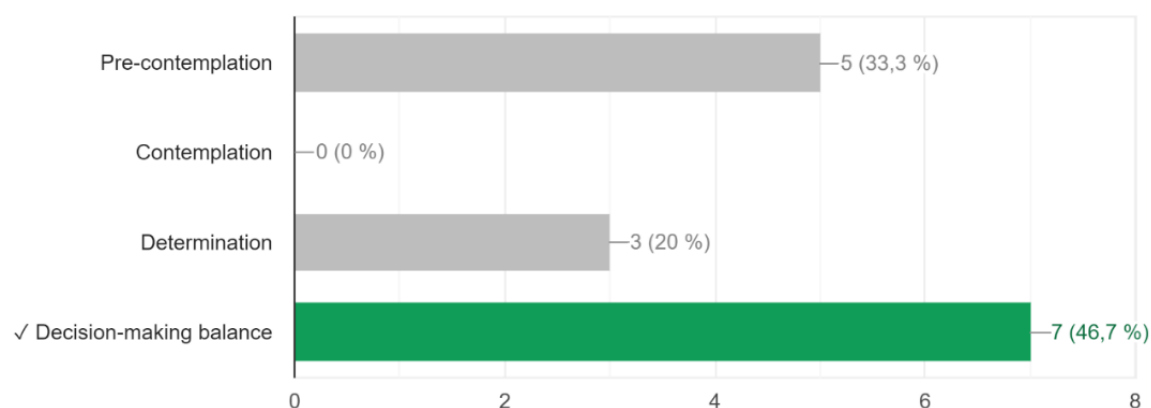
[Go to index](#)

THEMATIC AREA: MOTIVATIONAL MODEL

Evaluation of the motivational section revealed significant improvement among participants in this particular area. Post-test results showed predominantly correct answers, indicating substantial progress in understanding and application within the subject. This progress indicates a marked improvement in the understanding and implementation of motivational model concepts after completing the course.

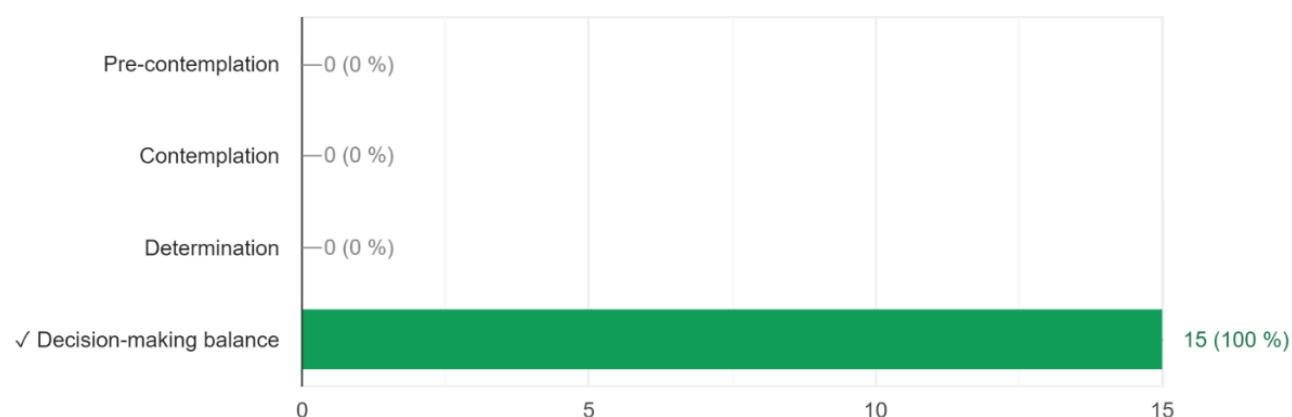
4. In the Trans-theoretical Model which of these stages does not fall within the stages of change:

Správných odpovědí: 7/15



4. In the Trans-theoretical Model which of these stages does not fall within the stages of change:

Správných odpovědí: 15/15





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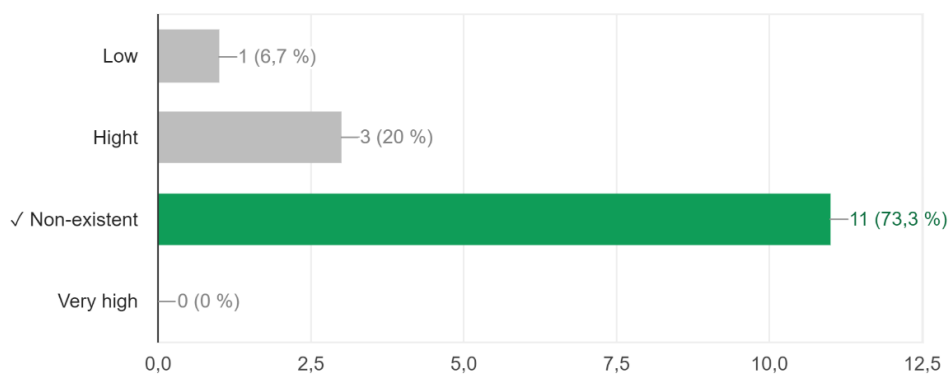


INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

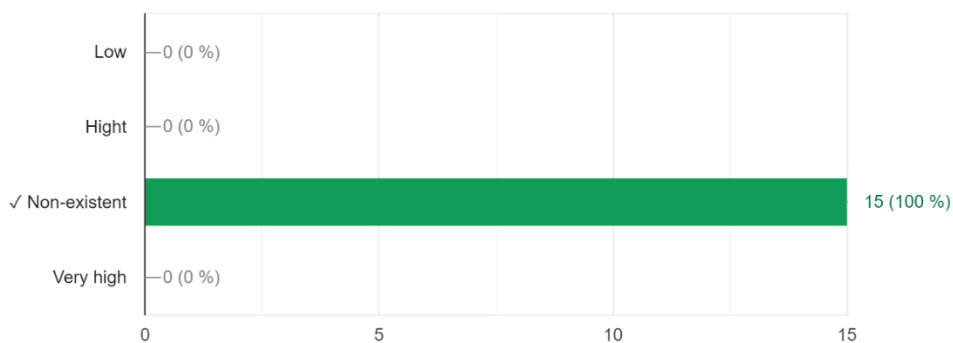
5. In the precontemplation stage, the decision balance is:

Správných odpovědí: 11/15



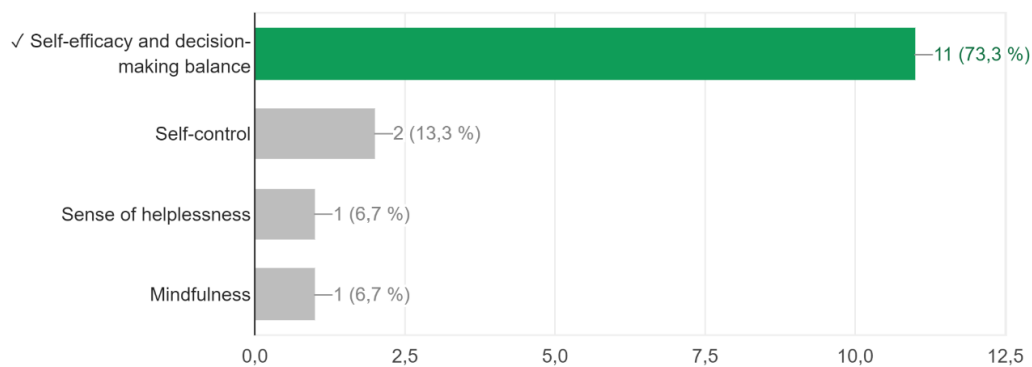
5. In the precontemplation stage, the decision balance is:

Správných odpovědí: 15/15



6. In the Trans-theoretical Model, what are the factors that play a role in the change:

Správných odpovědí: 11/15





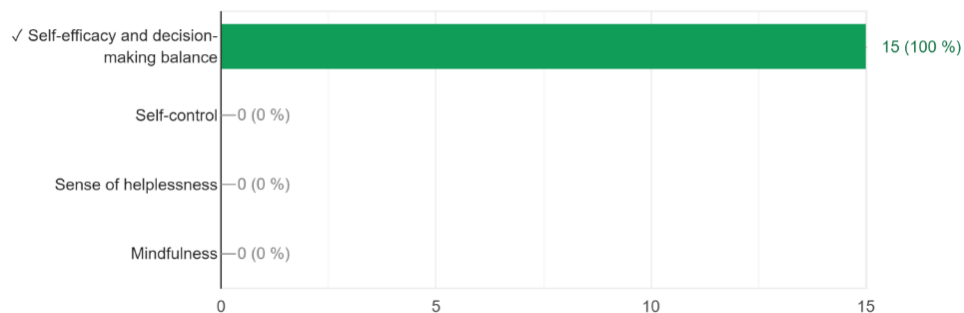
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[Go to index](#)

6. In the Trans-theoretical Model, what are the factors that play a role in the change:

Správných odpovědí: 15/15

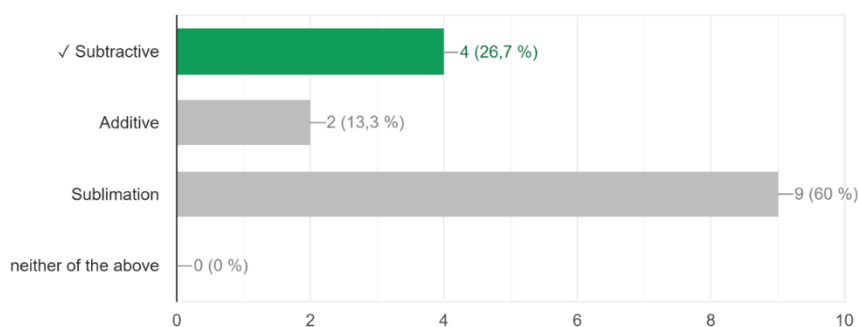


THEMATIC AREA: 3D PROTOTYPING

Evaluation of the area of 3D prototyping revealed remarkable progress among participants. Post-course evaluations predominantly displayed accurate responses, indicating significant improvement in understanding and implementation of 3D prototyping concepts. This shift demonstrates a significant improvement in participants' ability to apply 3D prototyping techniques after completing the course.

7. 3d Printing is a production technology:

Správných odpovědí: 4/15





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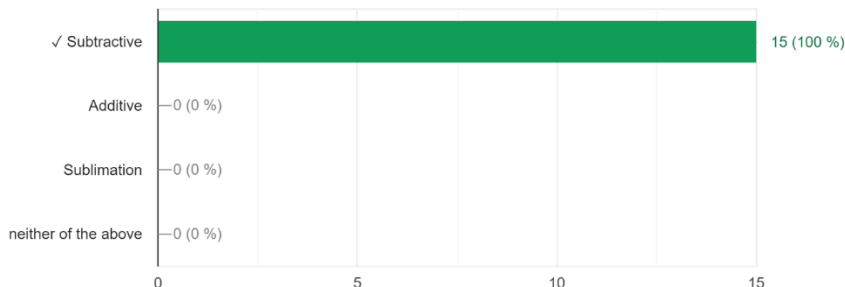


INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

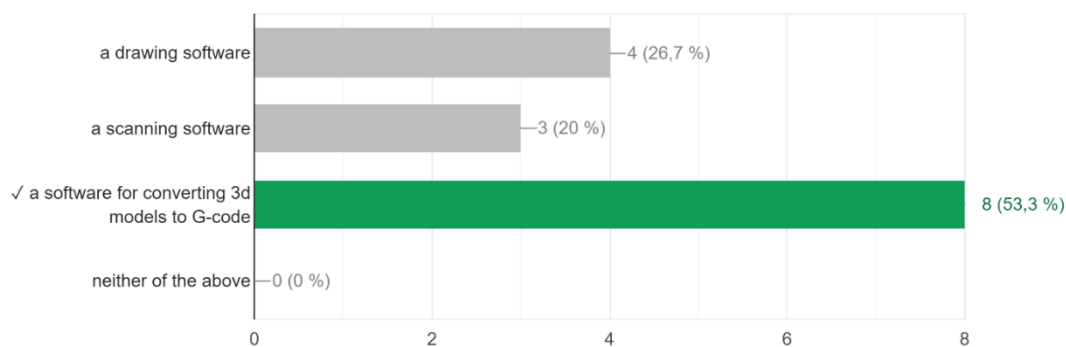
7. 3d Printing is a production technology:

Správných odpovědí: 15/15



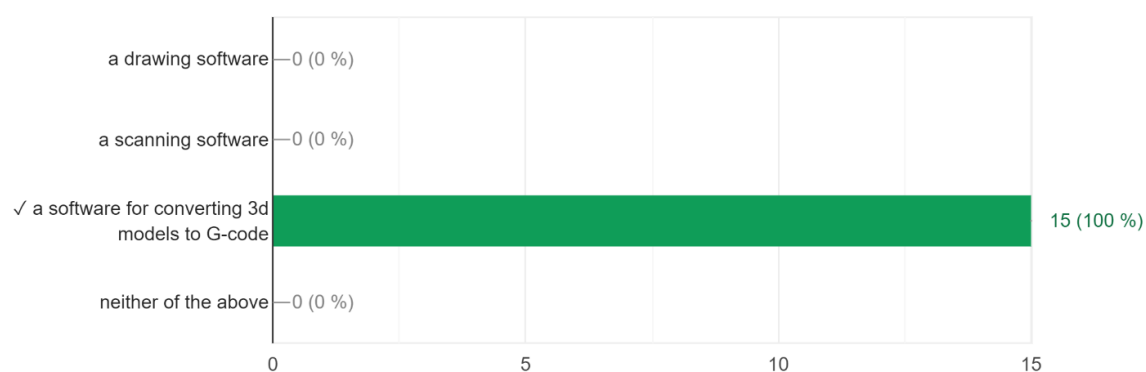
8. What is slicing software ?

Správných odpovědí: 8/15



8. What is slicing software ?

Správných odpovědí: 15/15





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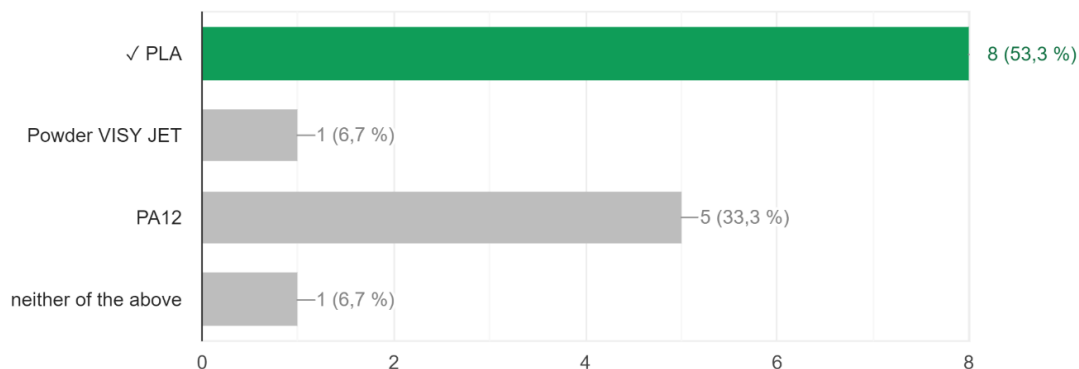


INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

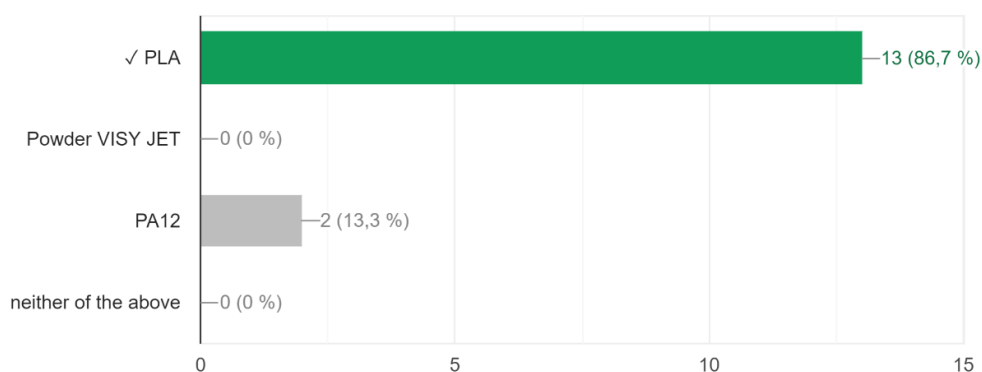
9. Which of these materials is used in 3d FDM printing?

Správných odpovědí: 8/15



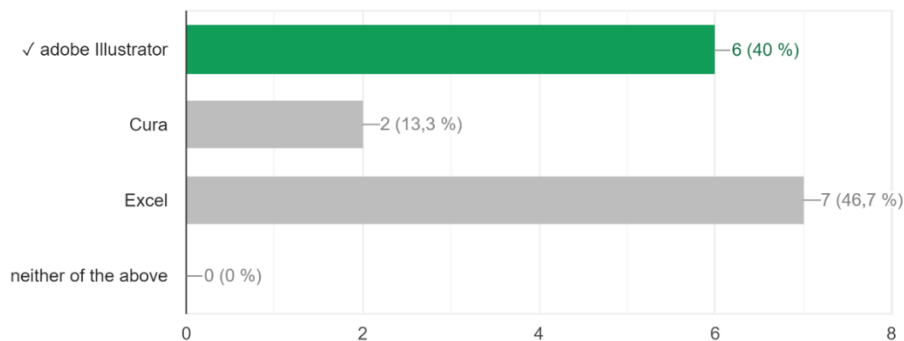
9. Which of these materials is used in 3d FDM printing?

Správných odpovědí: 13/15



10. Which among these software is necessary to use for the preparation of vector graphics?

Správných odpovědí: 6/15





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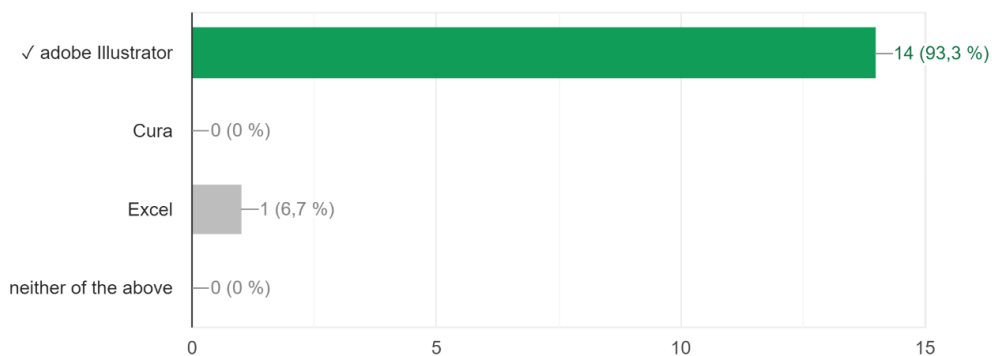


INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

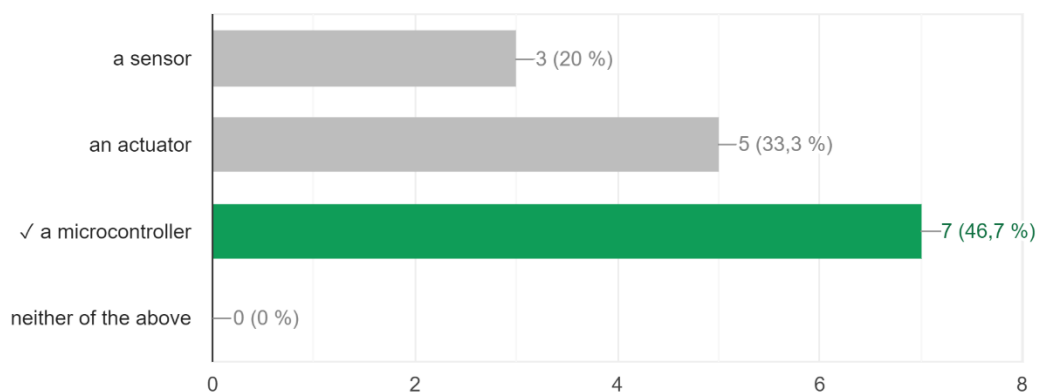
10. Which among these software is necessary to use for the preparation of vector graphics?

Správných odpovědí: 14/15



11. Arduino is:

Správných odpovědí: 7/15





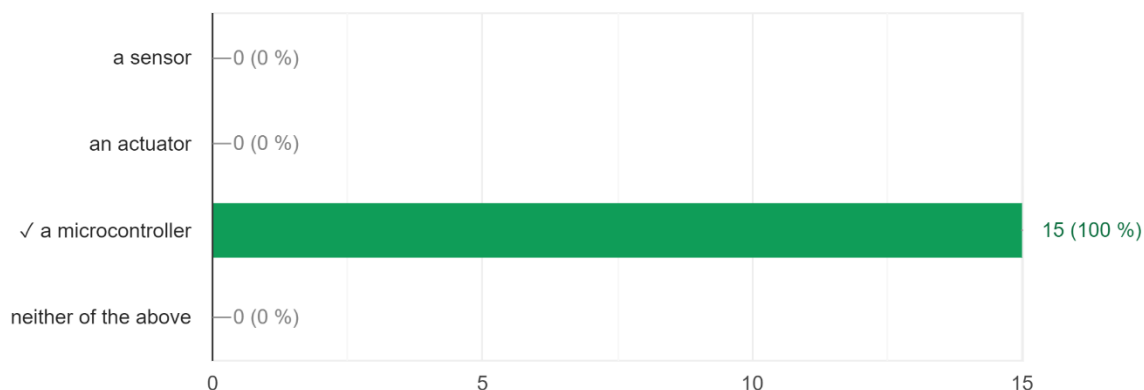
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[Go to index](#)

11. Arduino is:

Správných odpovědí: 15/15

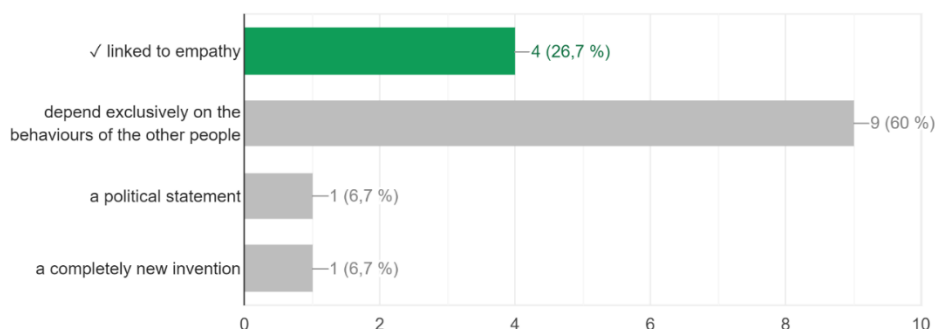


THEMATIC AREA PROSOCIAL APPROACH

After completing the course, evaluations of ratings related to prosocial attitudes showed substantial improvement among participants. Post-course evaluations predominantly demonstrated correct responses, indicating significant improvement in understanding and applying the principles of building trusting relationships with individuals facing varying degrees of disability. This progress underscores the significant development of participants' abilities to engage in a prosocial approach after completing the course.

12. Prosocial behaviours are

Správných odpovědí: 4/15





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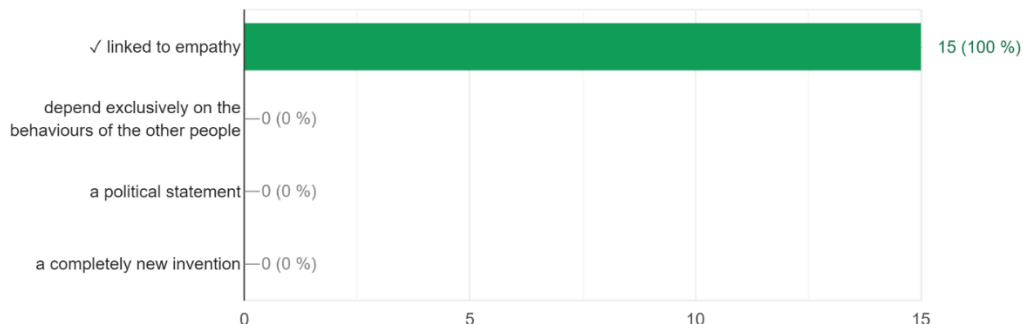


INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

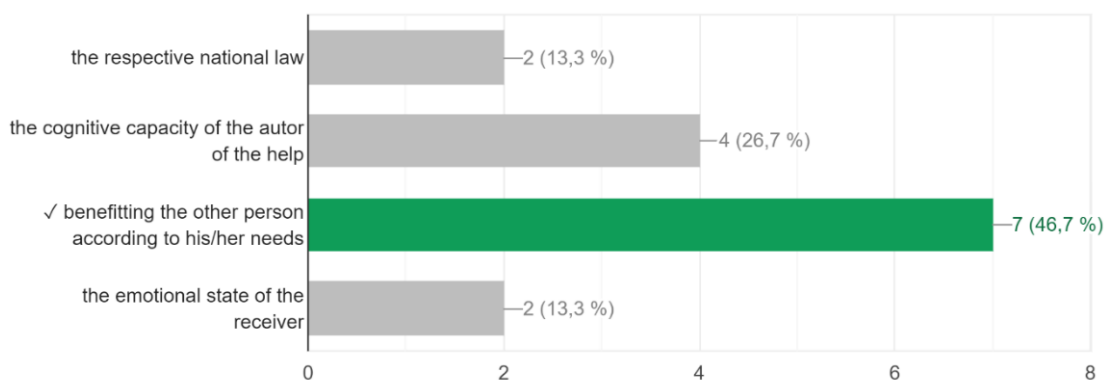
12. Prosocial behaviours are

Správných odpovědí: 15/15



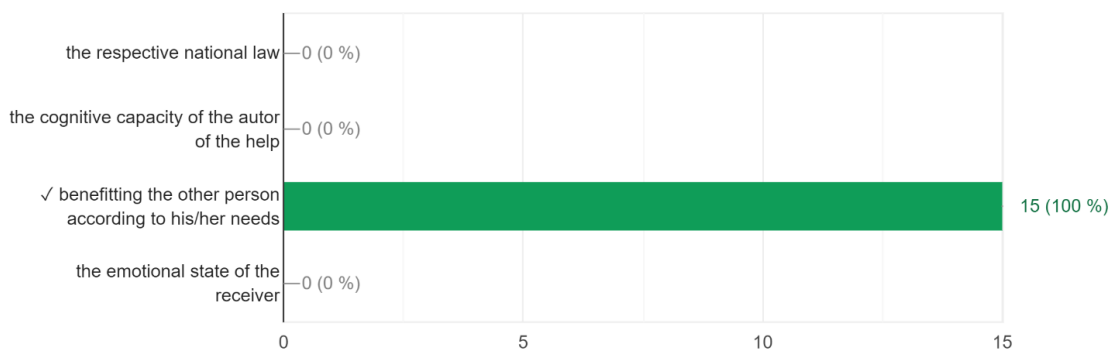
13. the definition of prosocial behaviours is based on

Správných odpovědí: 7/15



13. the definition of prosocial behaviours is based on

Správných odpovědí: 15/15





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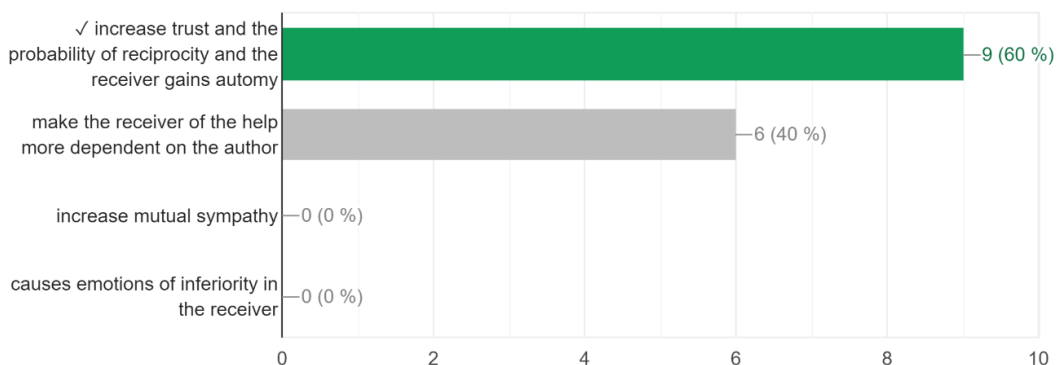


INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

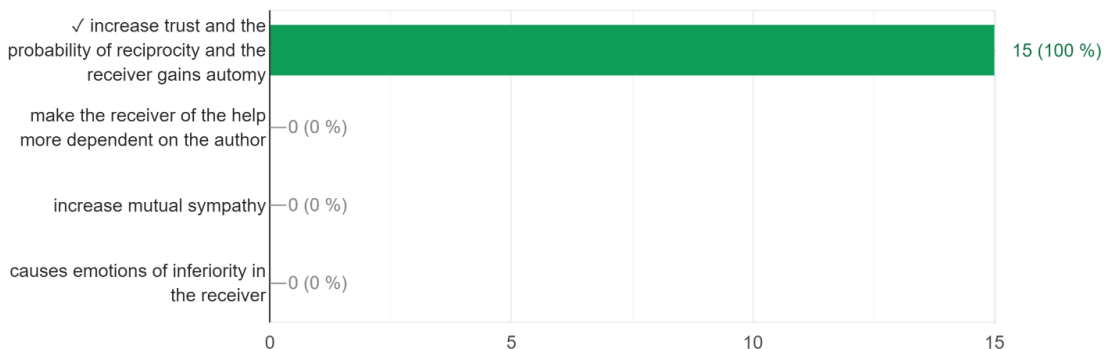
14. Which are important criteria for effective prosocial actions? Prosocial behaviours

Správných odpovědí: 9/15



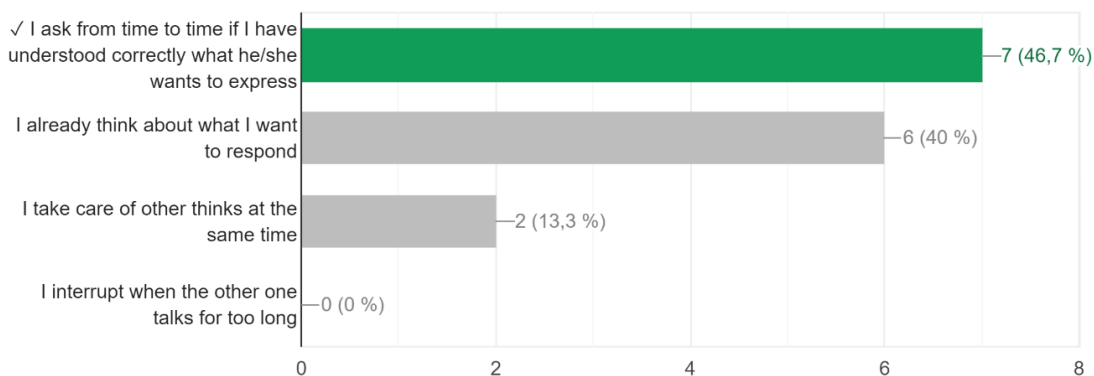
14. Which are important criteria for effective prosocial actions? Prosocial behaviours

Správných odpovědí: 15/15



15. When listening actively to the other person

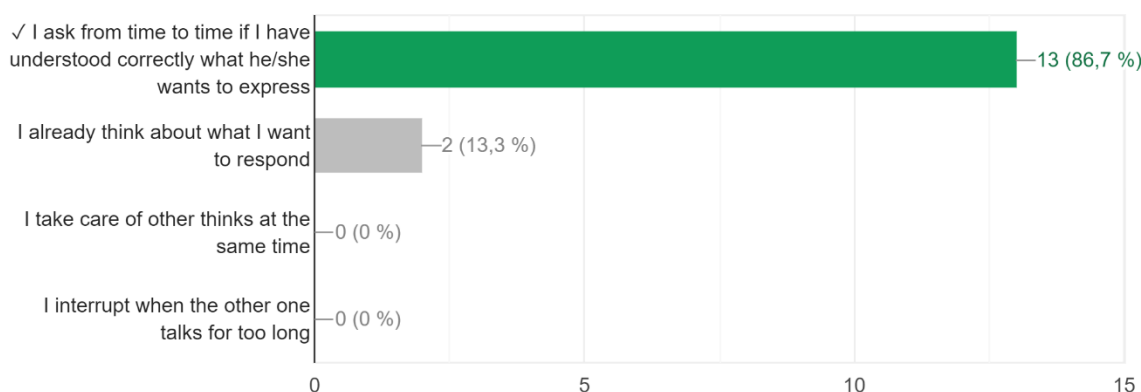
Správných odpovědí: 7/15





15. When listening actively to the other person

Správných odpovědí: 13/15



1.1.4. Recommendations and lessons learnt

From our point of view it's crucial to reserve sufficient time within the course for the practical segment, enabling participants to translate theory into practice and craft their own projects for 3D printing. This allocated time should be structured to foster creativity and experimentation in design, while also allowing ample room for consultations with lecturers or instructors. The hands-on component plays a pivotal role in engaging participants and DEEPening their comprehension of the specific challenges related to integrating 3D printing in occupational therapy.

Segmenting participants according to their proficiency levels in 3D printing could prove beneficial in customizing the educational approach to individual capacities. Diverse proficiency-based groups facilitate more targeted instruction and exercises tailored to the distinct requirements of each group. Such segmentation also permits a more focused exploration of advanced techniques for those well-versed in 3D printing, while beginners establish stronger foundational skills and receive personalized guidance for their advancement. This strategy heightens the effectiveness of instruction and more accurately reflects the array of knowledge and competencies among course attendees.

Considering our experience It's important to allocate ample time in the course for the practical segment, allowing participants to apply theory into practice and create their own projects for 3D printing. This time should be structured to encourage creativity and experimentation with design while providing enough room for consultations with lecturers or instructors. The hands-on part is crucial for engaging



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[Go to index](#)

participants and DEEPening their understanding of the specific challenges associated with utilizing 3D printing in occupational therapy.

Grouping participants based on their level of experience with 3D printing could be advantageous for better tailoring the teaching approach to individual needs. Groups with different proficiency levels allow for more targeted instruction and exercises tailored to the specific needs of each group. Such grouping also offers the opportunity for a more intensive focus on advanced techniques for those familiar with 3D printing, while beginners gain firmer foundations and individual support for their progress. This approach enhances the efficiency of teaching and better reflects the diversity of knowledge and skills among course participants.

1.2 Follow-up meetings

1.2.1. Context and methodology

After the end of the pilot courses, follow-up activities took a place. A total of 30 people participated in these activities. These were course participants from the last two dates. There were 13 people in the first group and 17 in the second. These activities were implemented through a personal meeting with the participants immediately after the end of the course, as in the next term it would probably not be possible to gather all the participants again for a personal meeting due to organizational reasons.

After the training, a focus group was held to evaluate the impact of participation in the DEEP pilot course. The focus group was structured according to the open-ended questions recommended in the project aimed at obtaining ideas and opinions from the direct target group.

The semi-structured questions used during the focus groups were:

- *How has your relationship with people with disabilities improved after DEEP training? What was changed or will change in the near future?*
- *What is your current feeling about integrating SD technology into your practice? What are the advantages and disadvantages of using the technology?*
- *How do you think about networking and co-designing with others? Who would you consider suitable to involve in your activities in the future?*
- *How do you feel about your work and tasks after training? What has changed?*
- *Is there anything you would like to add?*



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[Go to index](#)

GROUP A	GROUP B
Follow-up days: 14 June 2023	Follow-up days: 6 September 2023
Location: HERTIN s.r.o., Škroupova 4, Ostrava)	Location: HERTIN s.r.o., Škroupova 4, Ostrava
Number of participants: 13 professionals	Number of participants: 17 professionals
Trainer: Hana Nevřelová	Trainer: Jan Pešat



1.2.2. Discussions and feedback gathered

**- How has your relationship with people with disabilities improved after DEEP training?
What was changed or will change in the near future?**

The discussions with participants in the aforementioned course regarding the impact of DEEP training on their relationships with individuals with disabilities yielded profound insights. Many expressed a notable shift in their approach, emphasizing a DEEPer understanding and heightened sensitivity towards the needs and challenges faced by people with disabilities. Participants highlighted an increased sense of empathy, leading to more meaningful interactions and a greater inclination to actively involve



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[Go to index](#)

and empower individuals with disabilities in decision-making processes related to their care and assistance. Moreover, several attendees discussed their intention to implement newfound strategies and approaches acquired from the training, aiming to foster more inclusive environments and tailor interventions more effectively to the unique needs of each individual they serve in the near future. Overall, the discussions underscored a tangible transformation in perspectives and actions, demonstrating a promising evolution in their relationships with people with disabilities post-DEEP training.

- What is your current feeling about integrating 3D technology into your practice? What are the advantages and disadvantages of using the technology?

Participants presented diverse viewpoints on incorporating 3D technology into their practice. Many perceive the benefits positively, including enhanced efficiency, the ability to personalize interventions for clients, and improved progress tracking through technological tools. They view 3D technology as holding the potential to elevate the quality of care and deliver better services. Conversely, some drawbacks were highlighted, such as the need for time and resources to refine skills in utilizing this technology and potential issues with the availability or reliability of devices. The discussion underscored that while 3D technology offers numerous advantages, it's crucial to consider potential challenges and investments associated with its integration into everyday practice.

- How do you think about networking and co-designing with others? Who would you consider suitable to involve in your activities in the future?

Participants expressed various attitudes towards connecting with others and collaborating on designs. Many see significant potential in this activity for sharing knowledge and experiences, broadening perspectives, and creating innovative solutions. Those they believe would be suitable to involve in the future include experts from diverse fields, representatives from disabled communities, and creative individuals who can bring in fresh ideas and perspectives. The discussion highlighted the importance of an open and inclusive environment for collaboration, which can bring synergy and new approaches to supporting individuals with disabilities.

- How do you feel about your work and tasks after training? What has changed?

Participants expressed various feelings regarding their work and responsibilities post-training. Many mentioned increased confidence and assurance in applying new skills and knowledge gained during the training. Some highlighted improvements in the efficiency of their work processes and the ability to better respond to the specific needs of clients. The discussion showcased that the training had a positive impact on their



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[Go to index](#)

work by providing tools and perspectives that enable them to perform their duties in supporting individuals with disabilities more effectively and confidently.

- Is there anything you would like to add?

Participants took the opportunity to provide additional insights and reflections. Some shared further experiences or perspectives gained from the training, emphasizing specific aspects that were particularly impactful or areas they wish to explore further. Others used this opportunity to express gratitude or highlight the importance of continued learning and collaboration in the field. This open-ended question allowed participants to contribute additional thoughts or aspects they felt were important to address, enriching the overall discussion and providing a comprehensive view of their post-training perspectives.

1.2.3. Results and lessons learnt

Based on the responses to the questions, results indicate positive impacts from the training. Participants exhibited increased confidence and assurance in applying new skills and knowledge gained during the course. Changes in their work procedures showcase greater efficiency and an improved ability to respond to clients' specific needs. These outcomes suggest that the training provided valuable tools and perspectives that enabled more effective care and support for individuals with disabilities. A crucial lesson is emphasizing the impact of continuous education in enhancing care and support in the field of disabilities and the necessity to further support skill and knowledge development in this sector.

Additional results and lessons can be seen in the feedback provided by participants who took the opportunity to add further perspectives and experiences. Their supplementary contributions enriched the discussion with additional viewpoints and aspects that were not initially covered. This underscores the importance of open dialogue and the opportunity to share perspectives for a comprehensive understanding of the needs and challenges associated with supporting individuals with disabilities. Overall, the results and lessons from this gathering seem to encourage further development and strengthening of care and support for this community.

1.3. Supervision meetings

1.3.1. Context and methodology

Supervision of course participants focused on verifying how they applied a prosocial approach and utilized 3D printing in their practical applications. The initial step involved

25



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[Go to index](#)

observing and assessing how participants integrated the prosocial approach into their work environments when dealing with individuals with disabilities. This included observing their communication, respect for individual client needs, and their ability to adapt to specific situations.

Regarding the application of 3D printing, supervision concentrated on monitoring how participants utilized this technology in their work. It examined how they integrated 3D printing into the creation and production process of aids or specialized devices for individuals with disabilities. Emphasis was placed on whether participants correctly identified client needs and subsequently created and adjusted 3D prints to best match specific requirements and provide tangible value.

The supervision was conducted using tools specifically developed for this project, namely ANNEXES IV, V, and VI. These tools provided a structured framework and methodology for assessing the application of a prosocial approach and the effectiveness of utilizing 3D printing. Attachments IV, V, and VI served as practical guides, allowing for a systematic and standardized approach to assessment, ensuring a comprehensive evaluation of how participants implemented prosocial methods and effectively used 3D printing in their professional practice. These tools were pivotal in ensuring consistent evaluation and offered a structured framework for analyzing the supervision results.

We aimed to evaluate the impact of the DEEP training model, which adopts a comprehensive, interdisciplinary approach, on the knowledge, skills, and competencies of the targeted professionals. The objective was to determine whether this model has brought about noticeable changes in these aspects.

1.3.2. Outcomes and results

The results of the supervision of the participants of the DEEP course showed the successful implementation of the pilot courses and significant changes in the behavior of the participants. The implementation of the courses can thus be considered effective. Participants showed significant progress in empathic and prosocial relationships.

DEEP pilot courses have been implemented with significant success. The results of the supervision clearly showed that the participants not only acquired new knowledge and skills, but also showed a stronger tendency to show empathy and create prosocial relationships in their work environment. Improvements in empathic skills and prosocial behavior were remarkable. Participants demonstrated greater sensitivity in communication and creating trusting relationships with clients or colleagues. The results



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[Go to index](#)

of the supervision suggest that the DEEP course produced significant changes in the participants' behavior, indicating a DEEPer understanding and application of the principles of an empathic and prosocial approach.

1.3.3. Next steps and lessons learnt

The supervision activities offered insight into various aspects associated with the DEEP model. Here are the main learnt lessons:

- The effectiveness of the DEEP model will become apparent when applied within one's own work environment. Professionals, after pilot training, test this model in their practice. Their feedback confirms its effectiveness in addressing the needs of professionals who choose to integrate it voluntarily.
- The assimilation of this model by intended professionals has led to a significant shift in perspective, not only in their interactions with individuals with disabilities, but also in professional relationships between colleagues from different educational backgrounds. This transformation has influenced their approach to caring for individuals with disabilities, fostering a multidisciplinary perspective and restoring dignity and individuality to patients. Collaboration has emerged as the most significant outcome resulting from this gained awareness.

1.4. Laboratory activities

1.4.1. Requests and needs addressed

Spoon holder

The person with a disability, who received a 3D printed spoon holder for testing in their daily life, evaluated this technological aid as useful and innovative. They delight in having access to a specially designed tool that facilitates handling a spoon in their daily activities. However, while appreciating the basic concept, they expressed interest in possible modifications that would enhance the effectiveness and comfort of using this aid. One of the main suggestions for improvement was to print the spoon holder precisely tailored to the size of the user's hand. They noted that customizing the size would increase comfort and ease of manipulation, significantly improving the daily usability of this aid.

Another proposed improvement was considering using a material with better grip or adding texture to the surface of the holder. This adjustment could provide better stability and support when gripping the spoon, aiding in a more secure and confident hold. This seemingly simple modification could significantly enhance comfort while eating and minimize the risk of the spoon slipping or falling from the hand during use.



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[Go to index](#)

Overall, this feedback indicates that while the 3D printed spoon holder represents a positive step toward facilitating daily activities for a person with a disability, there are opportunities for improvements that would increase effectiveness, comfort, and safety in using this technological aid.



Cigarette holder

The participant with a different disability who tested the 3D printed cigarette holder and spoon holder expressed similar opinions about these technological aids. Both individuals appreciated the innovative approach and the opportunity to access specially designed tools that facilitate handling a cigarette or spoon in their daily lives. However, both expressed interest in possible modifications to enhance the effectiveness and comfort of using these aids.

The primary suggestion for improvement was to print holders tailored to the size of their hands. Another requirement was that the cigarette holder should be made of

28



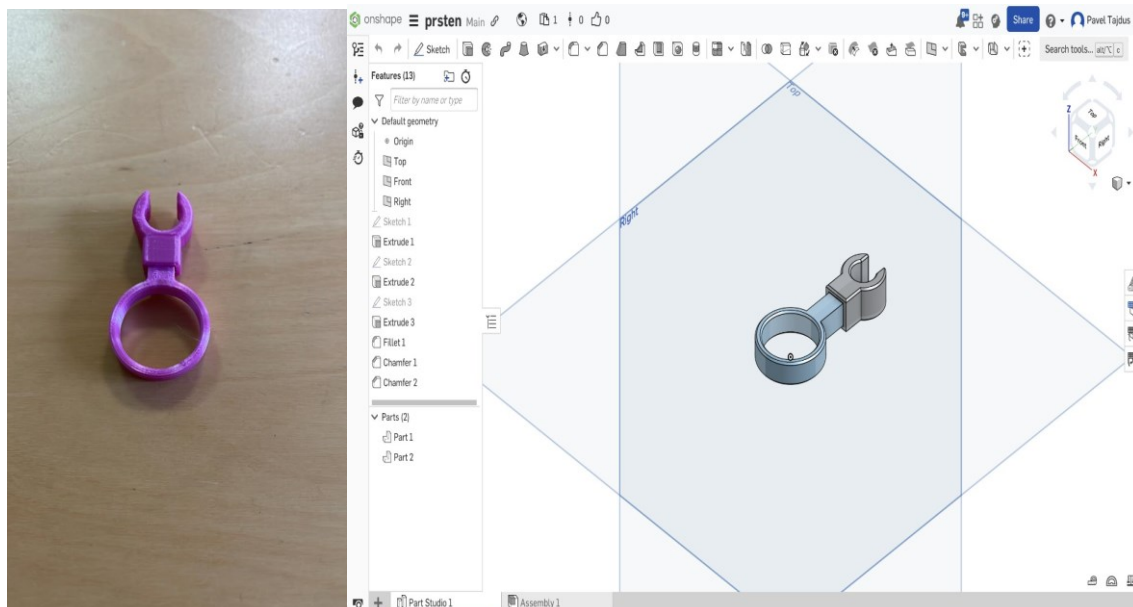
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[Go to index](#)

thermo plastic. Customizing the size would increase comfort and ease in manipulating the tools, significantly enhancing their daily usability. Another common proposal for improvement was considering using a material with better grip or adding texture to the surface of the holders. This adjustment would provide better stability and support when gripping, greatly aiding in a more comfortable and secure hold of the cigarette or spoon.

This shared feedback from both individuals indicates that while the 3D printed holders represent a positive step towards facilitating their daily activities, there are opportunities for improvements that would increase effectiveness, comfort, and safety in using these technological aids.



1.4.2. Activities performed

The creators of the 3D prints were thoroughly briefed on the results of the testing conducted by individuals with disabilities. The discussions with the creators involved detailed analyses of the modifications requested for the aids based on the testing. Throughout this interaction, a strong emphasis was placed on tailoring the dimensions and design of the aids according to the individual users' needs. The creators were acquainted with specific user requirements, providing valuable input for optimizing the prints.



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[Go to index](#)

Technical aspects of the modifications were carefully considered and addressed within the creator team. Adapting the dimensions and design of the prints to suit the needs of individual users was a key focus. The creators aimed to implement the requested changes within the technical capabilities of printing and utilizing appropriate materials. During this process, the resulting prints underwent repeated testing and adjustments to achieve an optimal outcome that best suited the needs and comfort of users with various disabilities.

This close collaboration between the creators of the 3D prints and users with disabilities underscores the importance of involving end-users in the development of technological aids. This approach not only achieves technical optimization but also ensures that the resulting aids genuinely meet the needs and provide maximum comfort to users with various types of limitations.

1.4.3. Results and lessons learnt

The requirements for adjustments to the 3D prints identified by the individuals who tested them were carefully considered and implemented. The main focus was on customizing the dimensions of the prints according to the users' hand sizes, both for the cigarette holder and the spoon holder. This individualization brought greater comfort and facilitated manipulation of the tools in their daily use. Additionally, considerations were made to improve the materials used for printing, aiming to ensure better grip and stability of the holders. These modifications were implemented to maximize comfort and effectiveness of the aids for the users.

The lesson learned from this experience is clear: creating 3D aids for individuals with disabilities tailored precisely to each individual is crucial. Tailoring the dimensions and design according to the specific user's needs yields the best results, enhancing effectiveness and comfort of use. Emphasizing the quality and structure of the materials used is also crucial, as these factors significantly impact the final comfort and satisfaction of the user with the 3D aid. It is essential to consider these aspects in the development and manufacturing of these technological tools to best serve the needs of users with various disabilities.



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[Go to index](#)

2. DEEP implementation in Italy

2.1. Local training

2.1.1. Stakeholders involved

During the preparation phase of pilot courses, the Applicant Villa Delle Magnolie provided for the activation of formal procedures with the Sinet organization in order to obtain the ECM accreditation for health professionals who will participate in the DEEP pilot training, while the HUB partner, thanks to its relations with the Eutropia training center, an organization accredited by the Miur and the Campania Region, had signed a letter of intent.

After activating these procedures for the formal recognition and accreditation of the course, Villa Delle Magnolie and HUB partners proceeded to send to the associated partners and all stakeholders potentially interested in participating at the pilot training course the third project newsletter containing information about the course organized in Italy: dates, modules, trainers. In addition, to enhance the dissemination of the training event, the course poster was uploaded to both DEEP's official website and FB and Instagram pages.

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DEEP

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DISABILITY AND PROFESSIONAL EMPOWERMENT ENGAGING 3D PRINTING

CORSO PILOTA DI FORMAZIONE

Nell'attuale contesto sociale caratterizzato dall'invecchiamento globale della popolazione, il numero di persone disabili è destinato ad aumentare. Il progetto DEEP parte dal presupposto che per affrontare questi cambiamenti sociali e le sfide che ne derivano, è fondamentale una formazione innovativa che sia in grado di riunire esperti appartenenti a diverse categorie professionali, superando la logica attuale che la disabilità sia un argomento limitato a settori specifici e abbracciando una visione ampia che tocca tutti gli ambiti della società.

A chi è destinato: professionisti sanitari, terapisti occupazionali, makers.
*Per i professionisti sanitari sono previsti 10 ECM.

Relatore	Social:
27 Aprile 10.00-13.00 Dott.ssa Eliana Moscano	@deep_projecterasmus
04 Maggio 9.30-13.30 Dott.ssa Francesca Caterino Dott. Antonio Mele	@Deep project Erasmus+
08 Maggio 10.00-13.00 Dott.ssa Eliana Moscano	Partner:
11 Maggio 10.00-13.00 Dott.ssa Eliana Moscano	HUB
18 Maggio 10.00-13.00 Dott. Antonio Mele	UAB
19 Maggio 10.30-12.30 Dott. Antonio Mele	technoport
	HERTIN

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[Go to index](#)

2.1.2. Content of the training

The pilot training course of DEEP project was conducted at the Villa delle Magnolie held in Castel Morrone (CE), it was developed in six days and counted the presence of 31 health professionals, 2 psychologists in training, and 9 makers (for a total of 42 participants). The course was delivered in a dual mode (blended learning), in fact, for each lesson there were professionals both in presence and online (in synchronous mode).

27 April 2023: first lesson

On the first day, 27 April 2023, the **presentation of the project** was held, specifying the aims and the activities included. The trainer was Dr. Eliana Moscano, an expert of prosocial communication, who during the meeting, proposed a series of activities aimed to boost the knowledge of participants and their initial knowledge level about the topics of disability and 3D printing.

First and last activity of the day was to share one's mood by placing a sticker at the emoticon represented. In Image 1. it can be seen that the mood was high among most of the participants both at the beginning and the end.

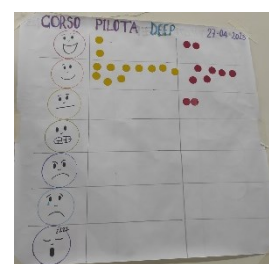


Immagine 1. Stato d'animo

Then, the participants were asked to share their level of knowledge about disability and 3D printing, based on both their educational background and work experience. In general, participants were on a medium level of knowledge, but regarding the 3D printing many were on a low level. Following this activity, there was a discussion among the participants from which the difference between makers and health professionals emerged, but this led to a mutual exchange of opinions and knowledges referring to their own work field.

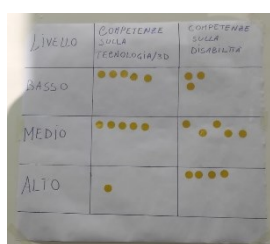


Immagine 2. Livello di conoscenze

At this point, the trainer shared with participants the project, its structure and underlying motivation, specifying the goals and methods for achieving them. At the end of the presentation, it was asked to each person to introduce themselves on the basis of both their personal and professional experiences in relation to the topic of disability, specifying their motivation for being present at the training course. The presentations revealed the training deficits in both fields and the need to create multi-actor teams



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[Go to index](#)

to provide, to those who need, an integrated and personalized multidisciplinary intervention.

An additional activity proposed was Prosocial Participatory Visualization: this is a methodology that allows the professionals who are trained to be considered, from the earliest stages of the training, as experts, and the frontal lesson, that is asymmetrical, is thus eliminated. In addition, this approach allows to analyze the professionals' needs and thus the trainer's intervention to be calibrated: based on the needs that emerge, the focus will be on some aspects over others.

To each participant was given a blank card on which to answer the target question "What difficulties do I experience in "working" with people with disabilities?". Professionals present online on Meet answered at the same question through the use of a digital tool named padlet. The responses were then grouped, based on similarity, according to categories named by the participants, which were ordered by importance by the same.



Immagine 3. Visualizzazione Partecipata Prosociale

Seven categories emerged (in order of importance):



Immagine 4. Categorie ordinate per importanza

1. **Fostering patient empowerment;**
2. **Scarcity/absence of knowledge;**
3. **Difficulty/absence of multidisciplinary work;**
4. **Related structural (external and internal) difficulties;**
5. **Working on one's personal dynamics;**
6. **Empathic-relational difficulties;**
7. **Cultural barriers.**

Participation was particularly active and the discussion among various professionals present constructive.



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[Go to index](#)

4 May 2023: second lesson

During the second day, 4 May 2023, a presentation was held on **disability**, the **bio-psycho-social model**, and **benefits of technology in the world of disability**. The trainers were Dr. Francesca Caterino, psychologist, and Dr. Antonio Mele, 3D printing expert.

The first proposed activity was "Counter-Cards": Counter-Cards are images that attempt to emphasize or, conversely, deconstruct common stereotypes associated with gender, health/disability, ethnicity/nationality, weight, profession/lifestyle, gender/sexual orientation.

To participants were given two cards respect to which they had to say the first thing they thought associated with the image, no matter how politically incorrect or stereotypical. Then, the professionals were divided in two groups with the aims of

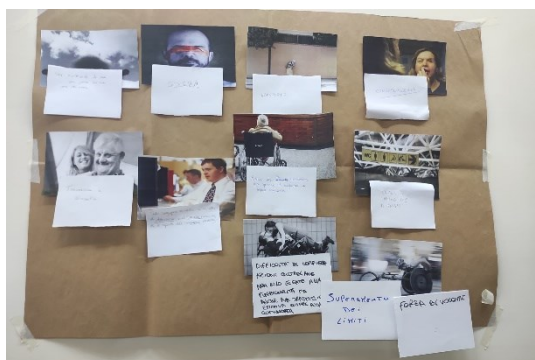


Immagine 5. Contro-Carte

inventing a story that had the focus on counter-stereotypes, positive or negative (examples of stories that emerged: an elderly woman who defaced her beloved's wall because he was cheating on her or a person with paraplegia who, for job, was a delivery man).

At this point, the evolution of the concept of disability over the years, its classification, and different types (motor, sensory, intellectual) was

presented.

In order to allow for a better internalization of the theoretical concept illustrated, especially to experience the types of sensory disabilities, the activity "The border of contact" was proposed, which consisted, as much as possible, of disabling multiple sense (through the use of blindfolds and/or caps) and exploring the environment with the help of a partner.



Immagine 6. Due partecipanti del corso, di cui uno con gli occhi bendati



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[Go to index](#)



Immagine 7. Uno dei gruppi impegnati nella stesura della canzone

While, to experience motor disability, the activity “Running as a disabled” was proposed: participants were divided into groups, in each of which one of the members had to simulate a motor disability (e.g. Tourette, ...). The purpose was to have all members perform some activities such as drawing a group portrait, writing a song about training and building a paper boat. Finally, one or more supporting tools made by 3D printing were introduced for each type of disability.

8 May 2023: third lesson

The third day, held on 8 May 2023, was led by Dr. Eliana Moscano, psychologist, who introduced the **Prosocial Model**. According to this model, there are a series of behaviors and attitudes that characterize the prosocial behavior, and which can be measured. These behaviors can be divided into preliminary factors, process, contents, metacommunication and after the communicative act.

In the first instance, the topic of prosociality was introduced by exploring the concepts of prosocial behavior, the factors that define it, and the cost involved in applying it in everyday life.

At this point, the self-assessment questionnaire (see Image 8) was given to all participants. It was asked to respond to it by considering the approach used in both private life (x) and work life (o). the purpose was made visible, through the graph that was created at the end of the compilation, both one's behavior in each of the two areas and comparison between them.

For each individual item, an explanation was provided, and it was DEEPened through participants' questions, which could clarify its meaning. A real moment of dialogue and discussion was created between the different

Modello della comunicazione prosociale di qualità (PQC): autovalutazione

Fattori, attitudini e comportamenti		5.	4.	3.	2.	1.
		Sempre	Spesso	Qualche volta	Quasi mai	Mal
Fattori Preliminari	1. Apertura e prontezza come ricevitori					
	2. Opportunità come iniziatori					
Processo	3. Sruotarsi					
	4. Vivere a fondo il momento presente					
	5. Empatia, reciprocità e unità					
	6. Conferma della dignità altrui					
	7. Valutazione positiva del comportamento dell'altro					
	8. Ascolto di qualità					
	9. Espressione di qualità					
	10. Accettazione di cosa è percepito come negativo					
	11. Risoluzione del conflitto da una prospettiva positiva					
	12. Prendere decisioni condivise					
Contenuti	13. Informazioni appropriate, pertinenti, non eccessive, rappresentative e frequenti					
	14. Apertura a rivelare le proprie emozioni					
Metacommunicazione	15. Verifica e controllo del processo comunicativo					
	16. Rendere esplicite le regole strutturali del sistema in maniera prosociale					
Dopo l'atto comunicativo	17. Coltivare e portare avanti un obiettivo empatico e concreto					

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Immagine 8. Questionario di autovalutazione PQC



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[Go to index](#)

professionals and the trainer, it was shown a DEEP interest in this topic, and the participants got involved by initiating an introspective process.

Immagine 9. Esempio di questionario

At the end of the compilation, as already anticipated, it was asked to combine the point in order to generate two graphs that describes the trend of their behavior in the two areas considered and to share with the group the total figure by making comparison between private and professional life, but also between the individual factors that characterize prosocial behavior.

Also, in this case, the discussion was participatory and engaging, and professionals said they had come to understandings that could have been the starting point for a significant change.

May 2023: fourth lesson

On the fourth day, 11 May 2023, there was a lesson on the **Transtheoretical Model (TTM)** which focuses on the individual's decision-making process, and it is therefore an intentional change model that uses a temporal dimension. The trainer was Dr. Eliana Moscano, psychologist. After a theoretical introduction on the model (presentation of the stages of change), an exercise was held to learn how to use a tool proposed by the model: the decision balance.

Si chiede alla persona di compilare questa Bilancia Decisionale a quattro braccia.

MOTIVI PER MANTENERE LO STATUS QUO 1)	MOTIVI PER CAMBIARE
2)	1)
3)	2)
ALTRI...?	3)
SVANTAGGI NEL MANTENERE LO STATUS QUO	SVANTAGGI DI CAMBIARE
1)	1)
2)	2)
3)	3)
ALTRI...?	ALTRI...?

Immagine 10. Bilancia decisionale

Participants were asked to think about what they would like to change about themselves and to consider the advantages and disadvantages of the choice or not choice by filling in the table. At the end of the compilation, liberally, some examples were shared.



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[Go to index](#)

The trainer continued with the explanation of the model (cognitive-experiential processes, behavioral processes, and psychological factors as factors that impact on change processes) and at the end proposed a further activity. This activity involved, through the technique of role playing, a simulation of a motivational stage by two people (patient and professional), a successive identification of the stage acted out (which was unknown to participants) and an evaluation of the professional's reactions to the patient's behavior.

The group participated in an active and reasoned manner, sharing their opinions, and giving examples of appropriate and inappropriate behaviors they assumed on every day.

Protocollo di osservazione della competenza motivazionale di diversi stadi motivazionali					
Simulazione dello stadio della PRECONTEMPLAZIONE in cui si trova la persona con disabilità. Sono osservabili le seguenti reazioni da parte del professionista.					
	1= mai	2= quasi mai	3= a volte	4= quasi sempre	5= sempre
1 di fronte al rifiuto mantiene un comportamento disponibile					
2 riprende e riformula ciò che paziente dice mostrando una buona capacità di ascolto attivo					
3 tentativi ripetuti di convincimento					

Immagine 11. Protocollo di osservazione

18-19 May 2023: fifth and sixth lessons

The last two days of the course, held on 18 and 19 May 2023, were conducted by Dr. Antonio Mele, a 3D printing expert, and focused on a **3D printing in the world of disability**. The topic discussed by the trainer developed along two days.

At first, a theoretical background on 3D printing and some examples of supports already produced were provided, and then participants were asked to design a technical aid that they thought would be useful in reference to a type of disability. The aims of the activity were:

1. To learn how to design a technical aid;
2. To identify appropriate materials;
3. Learning to check its technical feasibility

To do this, participants were given a table to guide them in the implementation of their idea (see Image 12).

At the end of the compilation, professionals shared their proposal in detail, and a judgment was provided for each based on 8 criteria: technical feasibility, end users, need and motivation, cost, alternative offerings, time, and resources needed, reliability of the manufacturer, and additional end users. Each criterion was assigned a score from 0 to 3.



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[Go to index](#)



Idea di ausilio tecnico "dare un nome all'idea, ad esempio portaposate".
Individuare i componenti dell'ausilio e i fornitori esistenti/possibili di tali componenti.

Componente	Descrizione	Fornitore (i)	Tipo di rapporto con il/i fornitore/i
Prodotto			
Materiali			
Aggiornamenti sul prodotto			
Personalizzazione del design Necessaria			
Hardware aggiuntivo necessario			
Configurazione / test necessari			
Software necessario			
E' richiesta la formazione dell'utente finale			



Immagine 12. Modello di verifica della fattibilità tecnica

The ideas have been summarized in Image 13.

The ideation time was engaging and constructive, with all participants drawing on their own experience and underlining the importance of personalizing each aid according to both the physical and emotional needs of the patient.



IDEAS	METHODS OF EVALUATION		TECHNICAL FEASIBILITY	FINAL USERS	FIELD MOTIVATION	COST	ALTERNATIVE OFFERINGS	TIME AND RESOURCES	POSITIONING	FURTHER AND USERS	CRITICAL CRITERIA	SECONDARY CRITERIA	FINAL ASSESSMENT
A - playing cards	3	2	2	3	1	3	1	2	AVERAGE	STRONG	AVERAGE		
B - racket brace	2	2	1	1	1	2	1	1	AVERAGE	WEAK	WEAK		
C - crutch accessory for gripping objects	2	2	2	2	1	2	0	2	AVERAGE	AVERAGE	AVERAGE		
D - "dead" arm brace	2	2	2	2	1	1	1	2	AVERAGE	WEAK	WEAK		
E - smart glasses for deaf and dumb	2	2	1	1	1	1	1	1	AVERAGE	WEAK	WEAK		
F - aid for wearing shoes	2	2	2	2	1	1	0	2	AVERAGE	WEAK	WEAK		
G - sensor aid for NSU(spatial neglect)	3	2	2	3	2	2	1	1	STRONG	AVERAGE	AVERAGE		
H - deck of cards for grip problems	3	2	2	3	1	2	2	2	STRONG	AVERAGE	AVERAGE		
I - aid for holding onto the handrail/wall	1	2	2	2	2	2	1	1	AVERAGE	AVERAGE	AVERAGE		
L smart pants for leg	1	2	2	2	2	2	1	2	AVERAGE	AVERAGE	AVERAGE		



Immagine 13. Scheda di valutazione compilata



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[Go to index](#)

The discussion between healthcare professionals and makers revealed the importance of collaboration between the two figures in order to create products that totally meet the needs of the patient.

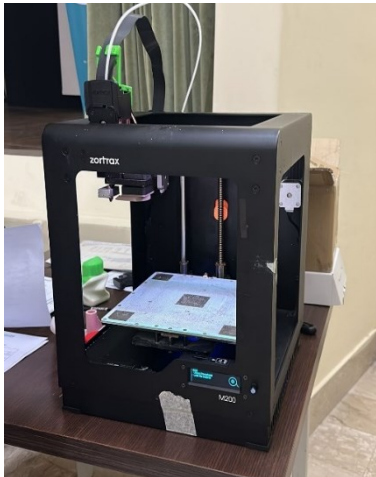


Immagine 14. Stampante 3D in fase di stampa

At the end of the exercise, and as a conclusion to the six meetings, it was shown how a 3D printer works from the creation of the model in the software to its printing.

2.1.3. Evaluation and feedback

In the evaluation addressed to professionals who participated in the pilot training (health professionals and makers), DEEP model experts designed an ad hoc questionnaire to measure learning outcomes to examine both areas of technical competence (hard skills) and interpersonal skills (soft skills).

In fact, the questionnaire created (Part III, Annex I of DEEP's Handbook) allows to assess the following aspects:

- Increase in knowledge on the topic of disability, in particular on the issues regarding motor, hearing, visual, and cognitive disabilities and relevant European legislative frameworks;
- Increase in knowledge and abilities regard to prosocial ad motivational approaches;
- Increase in knowledge and skills in the field of 3D prototyping;
- Increase in knowledge of the world of assistive devices and auxiliaries developed through technology.

In designing the questionnaire, a number of items was made that was representative of each training module provided by the DEEP model.

In fact, the questionnaire includes 38 questions divided by thematic modules of the training:



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[Go to index](#)

- 10 questions about disability (questions 1 – 10);
- 8 questions about motivational model (questions 11 – 18);
- 10 questions about 3D prototyping (questions 19 – 28);
- 10 questions about prosocial approach (questions 29 – 38).

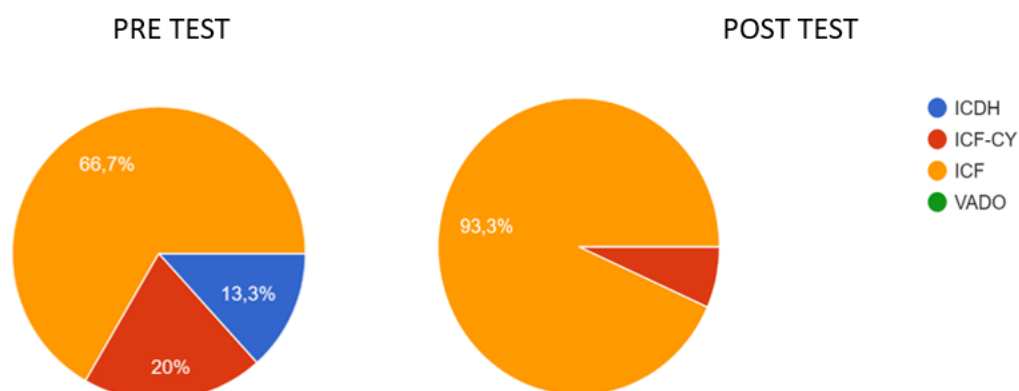
This questionnaire was also used by the provider who accredited the training course, as a test to evaluate the professionals (doctors, nurses, psychologists, psychotherapists) who participated in the training days and assign them the 10 ECM (continuous education in health care) provided for the target of health professionals.

During the meeting organized in Ostrava (second transnational meeting), partners agreed, with reference to this questionnaire and the light of the feedback reported by participants on the number of questions considered excessive, to reduce the questionnaire from 38 to 15 item, always respecting the representativeness of the content of the questions in relation to the training modules. In the following training, trainers administered this reduced version of the questionnaire.

In addition, in order to do a quantitative analysis of the responses provided by participants, partners agreed to choose, for each country partner, a sample of 15 professionals who participated in the pilot training from the total number of 42 health professionals and makers professionals (direct multi actor target).

THEMATIC AREA: DISABILITY

ITEM 1: *What is the main international classification system on disability?*





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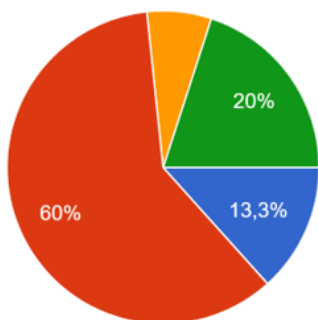


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PUBLIC POLICY INNOVATION

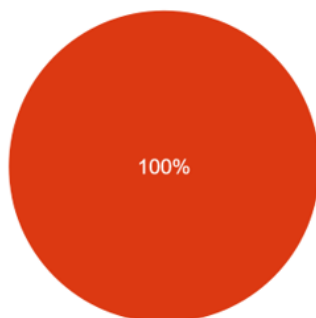
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ITEM 2: How are disabilities categorised?

PRE TEST



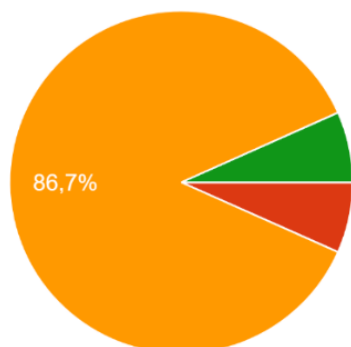
POST TEST



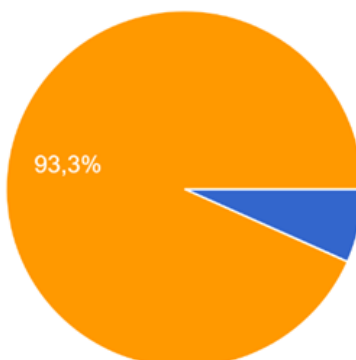
- Physical, psychic, intellectual and sensory
- Sensory, motor, intellectual and psychic
- Physical, intellectual and sensory
- Motor, intellectual and sensory

ITEM 3: Identify the correct statement

PRE TEST



POST TEST



- Sensory disabilities only concern eyesight and hearing
- Sensory disabilities only concern eyesight and smell
- Sensory disabilities affect the senses sight, hearing but also touch, taste and smell
- Sensory disabilities affect the senses sight, hearing and smell

As can be seen from the graphs above, there was an increase in knowledge in the area of disability, especially for professional makers. The percentage of incorrect answers in the pre-test corresponds, in fact, to the questionnaires filled in by these professionals.



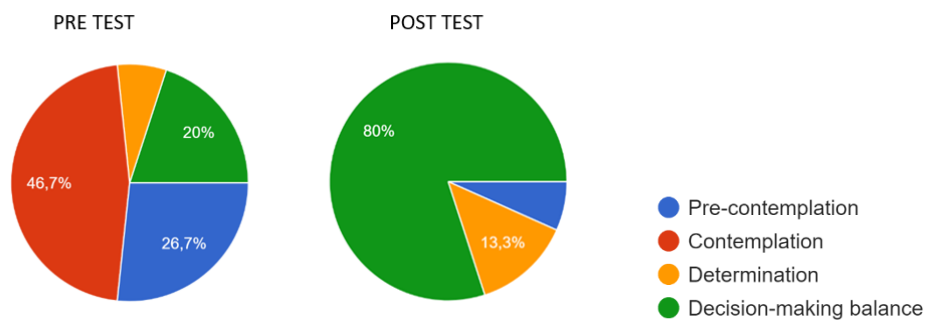
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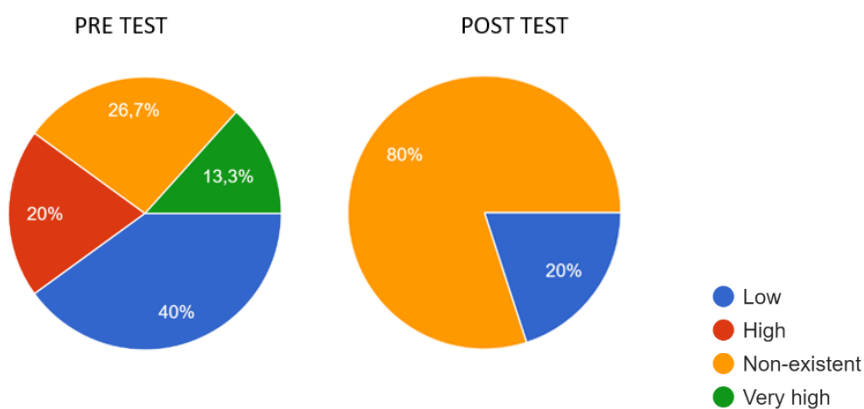
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THEMATIC AREA: MOTIVATIONAL MODEL

ITEM 4: *In the Trans-theoretical Model, which of these stages is not part of the stages of change.*



ITEM 5: *In the pre-contemplation stage, the decision-making balance is:*



ITEM 6: *In the Trans-theoretical Model what are the factors affecting change*





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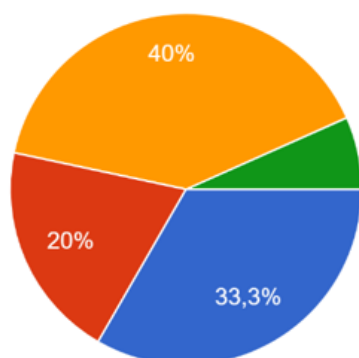
[Go to index](#)

About the motivational approach is concerned, there was an equal increase in knowledge for both healthcare professionals and makers. In fact, the percentages of incorrect answers in the pre-test were evenly distributed among the different professional categories.

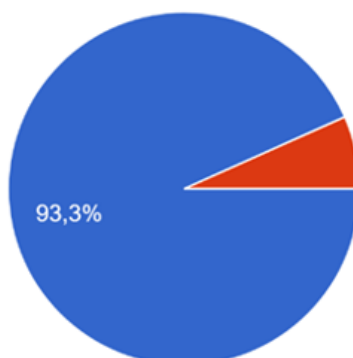
THEMATIC AREA: 3D PROTOTYPING

ITEM 7: *3D printing is a manufacturing technology*

PRE TEST



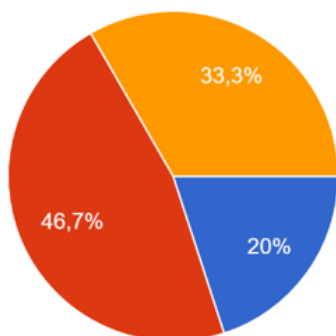
POST TEST



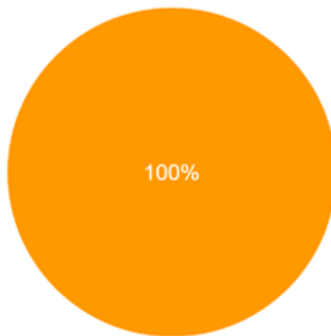
- Subtractive
- Additive
- Sublimation
- None of the above

ITEM 8: *What is slicing software*

PRE TEST



POST TEST



- drawing software
- a scanning software
- software for converting 3D models into G-code
- None of the above



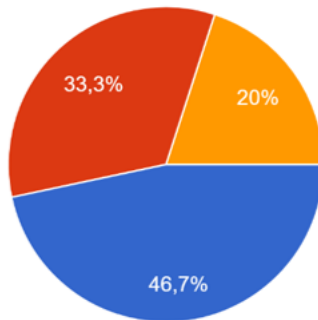
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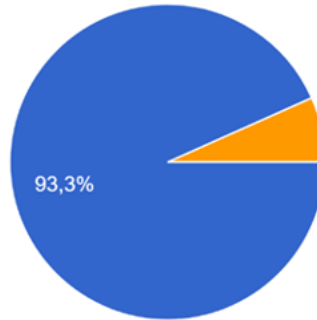
[Go to index](#)

ITEM 9: Which of these materials is used in FDM 3D printing?

PRE TEST



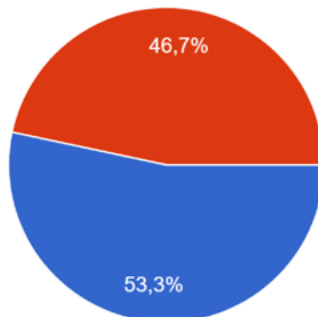
POST TEST



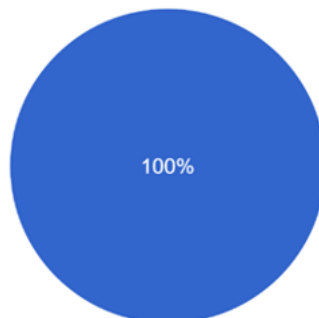
- PLA
- Powder VISYJEt
- PA12
- None of the above

ITEM 10: Which of these software packages should be used for the preparation of vector graphics?

PRE TEST



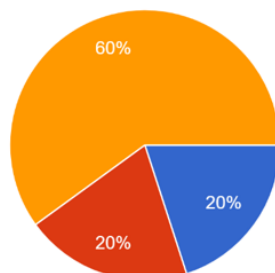
POST TEST



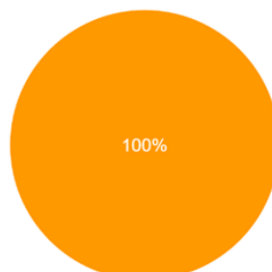
- Adobe Illustrator
- Rhinoceros3d
- Excel
- None of the above

ITEM 11: Arduino is

PRE TEST



POST TEST



- a sensor
- an actuator
- a microcontroller
- None of the above



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[Go to index](#)

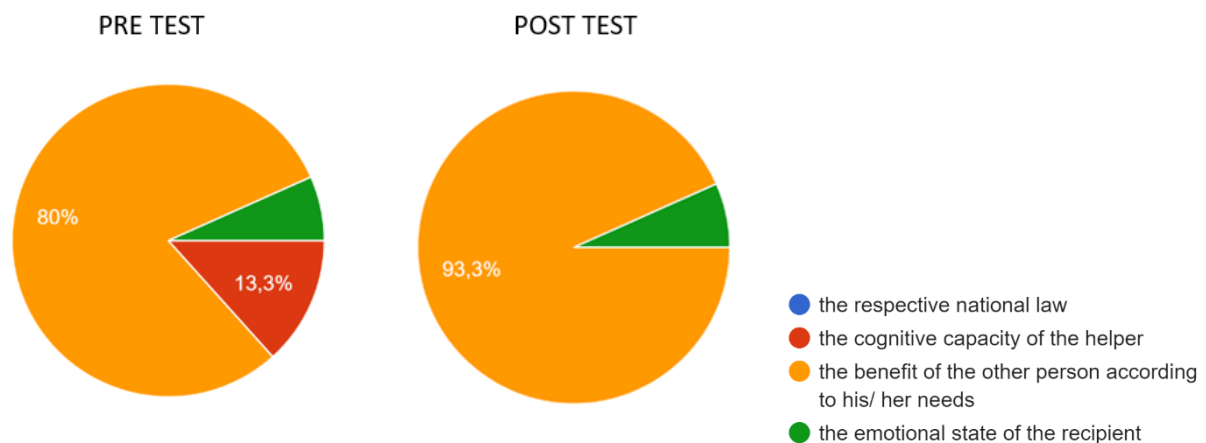
The graphs relating to the subject area of 3D prototyping also show percentages of correct answers in the post-test, thus confirming an increase in knowledge on the subject, especially for healthcare professionals who had no previous knowledge on the subject at the beginning of the course.

THEMATIC AREA PROSOCIAL APPROACH

ITEM 12: *Prosocial behaviours are*



ITEM 13: *The definition of prosocial behaviour is based on*



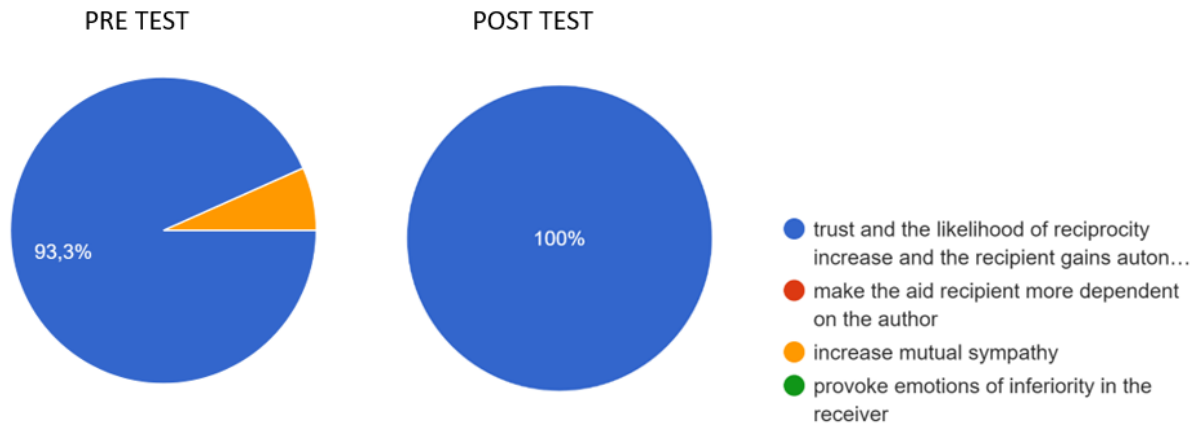


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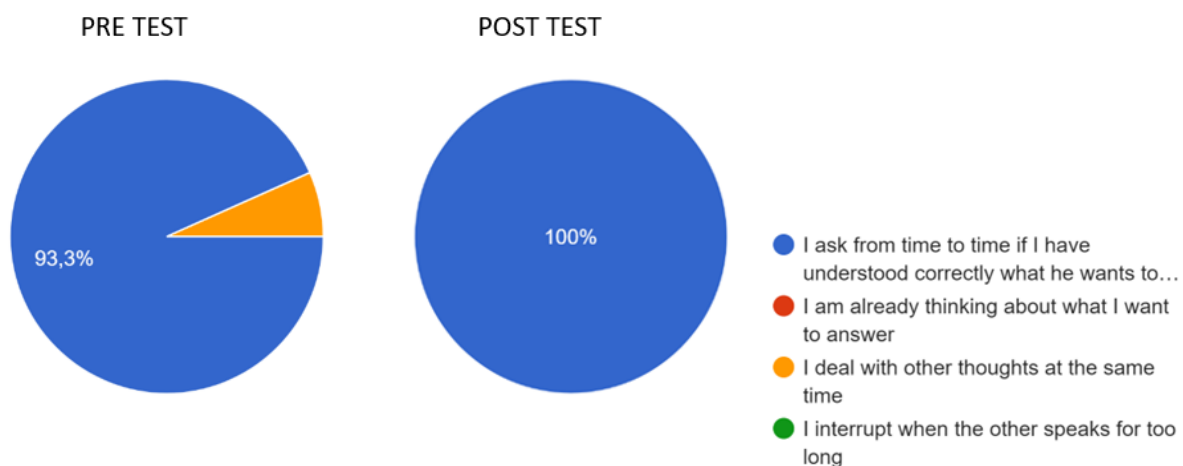


[Go to index](#)

ITEM 14: *What are the important criteria for effective prosocial actions?*



ITEM 15: *When I actively listen to the interlocutor*



The results of the items considered for the prosocial approach topic area show a small increase in the percentages of correct responses in the post-test compared to the questionnaire administered at the beginning of the course. The concepts involved in this approach are the basis of the patient – health professional relationship, so professionals possessed such knowledge at theoretical level. What was changed in positive terms is a self-assessment of their prosocial behaviors enacted in taking care of the person with disabilities. However, these results are not evinced from the questionnaire taken in that paragraph (in fact, here it is an assessment of the change generated by the course in terms of learning), but from the qualitative analysis of the follow-ups held with professionals after the training course and their



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[Go to index](#)

responses given to self-assess their willingness and desire to behave prosocially even in everyday view context (Part III, Annex II of DEEP's Handbook).

As can be seen from the graphs above, it emerges that professionals to whom the questionnaire was administered, they consolidated their knowledge about the topic of disability and 3D printing and increased their motivational and prosocial skills, which are essential for relating to people with disabilities.

2.1.4. Recommendations and lessons learnt

The experience on the pilot training planned in DEEP made us reflect on the importance of continuing to value innovative training experiences on the disability that go beyond a purely assistive logic and embrace an approach that, to be authentically inclusive, must provide a training that goes beyond the current idea and work practice that disability is a topic limited a specific area.

This pilot training experience made it possible to practically test a multidisciplinary and multi-actor training for professionals interested in various capacities in the topic of disability: only through this phase we could find out if effectively and participatively a mutual exchange of knowledges, skills, and experiences between the target professionals (health professionals and makers) could actually happen.

Certainly, providing multi-actor classes with experienced trainers on both the topic of disability in healthcare field and the role of technology helped to break down specialized terminologies, create a multi-actor network, and promote a common language from which to restart.

It is hoped that the experiences collected through these training experiences and the handbook produced to address the topic from a multi-disciplinary perspective can help to produce recommendations to be used in healthcare settings that deal in their own right with people with disability to multiply virtuous examples in our country.

2.2 Follow-up meetings

2.2.1. Context and methodology

Following the training days for healthcare professionals and makers (experts in 3D printing), held at the Villa delle Magnolie, the path continued with the implementation phase, through 2 follow-up meetings, involving 30 professionals (15 for each meeting) who previously took part in the pilot training.

47



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[Go to index](#)

The implementation was realized through 2 meetings of three hours each, during the period of June 2023.

The methodology used was the focus group, which was useful for assessing the impact that the DEEP model had on the work that professionals do in various capacities with people with disability.

The focus group is a qualitative methodology and a data collection technique, aimed at gathering information beyond quantitative analysis.

The focus groups implemented as part of the project were structured to promote the conversation among the target professionals and interpret the impact of the previous phases on the work with people with disability, DEEPening the group's opinions on the use of the learned model, 3D tools and technologies, aimed to promote teamwork and an empathetic and motivational environment.

In addition, the focus group allowed the partnership to collect contextual and complementary data ed examples of good practices which, in the analysis phase, were supplemented with the results from the questionnaires and semi-structured interviews.

In fact, during these meetings, timely observations and experiences were made, which were useful to complete the data needed for the analysis and the evaluation of impacts through the assessment tools identified in systematic evaluation of the transfer of leaning outcomes in the work context (Part III of the DEEP Manual).

The focus group was carefully planned and oriented to obtaining information and perceptions related to the impact of the DEEP training model on the direct target and structured according to a planned course of open-ended questions aimed at gathering ideas and opinions from the direct target audience.

During each meeting, a trainer and a facilitator were present in order to ensure a better and more usable data collection and to ensure that all participants had the opportunity to express their own opinion.

During the two follow up meetings, all participants were interviewed with the trainers (four weeks after the end of the training) to get information about the implementation of pro-social and motivations approaches, about the integration of 3D technology and their work practice.

The semi-structured questions used during the focus groups were:

[Go to index](#)

- How has your relationship with people with disabilities improved after DEEP training? What was changed or will change in the near future?
- What is your current feeling about integrating SD technology into your practice? What are the advantages and disadvantages of using the technology?
- How do you think about networking and co-designing with others? Who would you consider suitable to involve in your activities in the future?
- How do you feel about your work and tasks after training? What has changed?
- Is there anything you would like to add?

GROUP A	GROUP B
Follow-up days: 15 June 2023	Follow-up days: 22 June 2023
Location: Villa delle Magnolie Clinic, Castel Morrone (CE)	Location: Villa delle Magnolie Clinic, Castel Morrone (CE)
Timetable: 09.00 am -12.00 pm	Timetable: 09.00 am -12.00 pm
Number of participants: 15 professionals	Number of participants: 15 professionals
Trainer: Francesca Caterino	Trainer: Eliana Moscano



2.2.2. Discussions and feedback gathered

The two follow-up meetings were conducted through semi-structured questions aimed at the 30 participants from the previous classroom training and were organized four



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[Go to index](#)

weeks after the course concluded. Participants met for three hours, in two groups of 15, in order to discuss the implementation of the contents and methodologies acquired in the context of their work with patients.

The meeting had the following structure:

Each participant described, in a dedicated space, a situation that represents a change in their own attitude and ability to motivate appropriately, through the use of the categories of the Trans-Theoretical Motivational Model, toward one or more disabled patients. Then, the trainer proposed the follow-up question to test the degree of skill learned in relation to the Motivational and Pro-social Models.

“How has your relationship with people with disabilities improved after DEEP training? What was changed or will change in the near future?”

Each participant reported their feedback, and the following main areas of change and improvement of professionals emerged:

- Changes in the perception of one's role and professional identity;
- Changes in perceiving the manifestations of the person with disabilities related to his or her intentions and real needs, often concealed by surly hostile attitudes;
- Changes in one's behavior in difficult and frustrating relational situations that previously elicited automatic responses such as irritation, anger, hostility; some participants described this acquisition as the presence of a thought (reflection) arising in the mind before reacting to the patient's behavior. This juncture of time allowed them to block an automatic reaction (e.g., irritation) by replacing it with an atypical response (e.g., responding to offense with a kind tone, using active and empathic listening even in the presence of the patient's surly reactions);
- Changes in the ability to motivate a person with disability to cooperate, recognizing his or her limitations and trying to find alternative strategies to gain his or her cooperation.

Next, the trainer asked them to describe a relational situation with an uncooperative person with disability. Two participants volunteered to represent the situation in a simulation, assuming the roles (that of the health professional and the person with disability, respectively). The simulation went on for about ten minutes, until an alternative solution emerged clearly enough. Following the simulation, a phase designed for feedback began, where each participant reported his or her own's observations, perplexities, questions, and reflections. In this part of the intervention, which had the didactic purpose of reinforcing in the practice the use of the learned models, the trainer had the opportunity to take up the Motivational Model in order to recall and elaborate on the most appropriate concept and techniques to use.



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[Go to index](#)

Each participant then described his experience and expressed his opinion, following the DEEP training, on the integration of the 3D technology in his work context. The trainer then asked the follow-up question to ascertain the degree of learning about the use of 3D technology and the advantages and disadvantages according to the participants of using such technology in healthcare applied to the field of disability.

“What is your current feeling about integrating 3D technology into your practice? What are the pros and cons of using the technology?”

Each participant reported their feedback, and the following opinions emerged:

- It allows the creation of customized models using real data from each individual patient to intervene in specific pathologies and enables the production of objects designed specifically for people with different types of disability, tailored to the individual needs of each individual;
- It allows us to best respond to the individual needs and requirements of patients and make life easier for people with disabilities;
- Use the co-design as a tool to develop, inclusion, new skills, and new knowledge about the world of disability;
- It allows the person with disability to be involved in the co-design of an aid or facilitator, adapting it to their needs and motivating them to use it.

All participants agreed on the benefit of introducing these technologies into their work setting and were interested in integrating it, in future, into their work practice and in creating a professional team group dedicated to co-design where healthcare facilities provide the instrumentation and expert figures.

Each participant expressed his opinion and recounted his experience related to working with his or her colleagues and other professionals. Then, the trainer asked the follow-up question in order to check the degree of interest on teamwork of the participants.

“How do you feel about networking and co-design with others? Who would you consider suitable to be involved in your activities in the future?”

Each participant reported their feedback, and the following opinions emerged:



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[Go to index](#)

- Co-design enhances the skills of people with disabilities and the simultaneous construction, moderation and animation of working teams aimed at identifying, proposing, and implementing shared solutions;
- Brings together different professional categories and understands the views of target end users by involving them in the creative process;
- It enables the identification of more sustainable, inclusive, and participatory solutions within an empathetic and motivational environment geared toward the development of autonomy for people with disabilities;
- It allows some unsatisfied need of people with disabilities to be better met and supports them in accessing a wider range of activities with increased participation;
- It allows us to understand the true needs and desires of the target user, and to think about how best to meet these needs of people with problems and in complex situations;
- People with disabilities take advantage of greater personalization and value through co-creation processes.
- Involving people with disabilities in the design process increases their commitment to the project, generates broad support from them as they are involved in the process, and enables better communication and interaction with them.

Most participants agreed on the advantage of involving in their work activities, some professional figures as: makers (3D printing experts), designers and therapists, in order to create a real multidisciplinary that can support the co-design process. But at the same time involve people with disabilities and their families in order to design unique facilitators, under the banner of usefulness, specificity, sustainability, and beauty, where the design quality and aesthetic component become a vehicle and value to promote social inclusion.



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[Go to index](#)



2.2.3. Results and lessons learnt

From the feedback obtained during the follow-up, it can be concluded that the following clusters of changes in particular were recorded:

- IMPROVED SENSE OF SELF-EFFICACY related to the performance of tasks in the relational and psychological area with people with disabilities;
- IMAGE OF THE PERSON WITH DISABILITY: the patient appears more clearly defined not only through his behaviors, but also through his DEEPer needs such as that of confirmation of identity, respect toward personal preferences, etc.;
- IMAGE OF THE OWN PROFESSIONAL ROLE that enhances, in the sphere of tasks, the activities of the relational and psychological area, which are characterized by great complexity and affect the quality of performance;
- CARING FOR THE PERSON WITH DISABILITY: no longer just purely “welfare” but oriented toward the development of autonomy, social inclusion, and the prevention of forms of marginalization;
- TEAM WORK: relating to a change of vision focused on individual work to one on team work, resulting in a reworking of previous pattern of reference.

The follow-up used during the implementation phase allows to record an increase sense of self-efficacy in performing tasks in the relational area. Next to the purely relational aspects (establishing a good rapport, supporting, motivating, supporting psychologically, etc.), participants of the pilot course were able to obtain the cooperation of people with disabilities more easily during the motor and neurological rehabilitation therapies and to achieve an increase in motivation to use aids.



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[Go to index](#)

Health professionals repeatedly expressed that they felt more secure, more serene, and able to contain their own negative emotions such as anger or irritation. At the same time, they stated that they felt less sense of helplessness, either because they learned useful techniques to motivate the person with disabilities or because they are able to set more realistic goals.

In addition, a great tolerance toward the refusal to cooperate behavior of the person with disabilities emerged, given by a higher level of empathy with the person with disabilities.

Moreover, these two factors also seem to be related to a renewed image of one's professional role, enhanced in its communicative and relational components. The latter are often taken for granted skills that, although crucial to the quality of the relationship with the person with disability, are neither recognized nor enhanced as one of the key characteristics in the profile of the health professional.

Finally, the target professionals involved in DEEP, have overcome the logic that disability is an issue limited to specific areas and have embraced a vision, in taking care of the person with disability, that is no longer purely welfare but moves toward genuine and effective social inclusion. Through co-design with a multidisciplinary team and the involvement of the person with disability and his family members as active participants in the process, the development of autonomy, social inclusion, and the prevention of forms of marginalization are fostered.

It should also be added that, according to the participants, the improvement in psycho-relational skills (Prosocial and Motivational approach) and the increase in technological knowledge was across the board and affected all identified classes of difficulties. Participants also expressed the feeling of stability of the changes achieved (*"What I have learned, will remain with me forever"; "I am able to integrate what I have learned into my work practice"*).

2.3. Supervision meetings

2.3.1. Context and methodology

Supervision meetings addressed to target professionals (health professionals and makers) who had participated to the pilot training were organized in Italy at two different locations:

- Health professionals participated in these meeting at Villa delle Magnolie Clinic, a rehabilitation structure affiliated with the National Health System. In reference



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[Go to index](#)

to these meetings, the referent for the healthcare field was Dr. Francesca Caterino, who works at the clinic as Psychologist for a total of 18 hours per week.

- The makers participated at the partner HUB'S fablab. There, the contact person for the technology area was Dr. Antonio Mele, who holds the position of 3D printing expert at Giugliano fablab.

These supervision meetings were used to consider how the professional related during the course of his or her work with the person with disability who is using a treatment/rehabilitation service or participating in some occupational or recreational activity (such as learning how to prototype/make an aid with 3D printing).

The goal was to assess if the DEEP training model, based on a holistic and multidisciplinary approach, has produced changes in terms of knowledge, skills, and competencies in the target professionals.

Two methodologies were adopted to examine this aspect:

- That of participatory observation used by Dr. Caterino at the wards where patients are hospitalized for psycho-motor rehabilitation.

The methodology of participatory observation promotes the intersubjective matrix: by observing the other in front of him, the professional is able empathically to identify with the other, to feel what the patient is feeling and, consequently, by making these experiences his own, his action will be targeted and tailored to the subject or problem observed. This methodology is crucial in our project because, in participatory observation, it is very important to recognize the other's subjectivity and uniqueness.

Participatory observation is an active observation in which observer and observed subject interact together. In participatory observation, one of the most important factors is the intentionality. Observation of one subject's action by another individual require a type of contextualization capable of clarifying the intentions of both, both explicit and implicit intentions, as well as the choices, decisions, actions, and times in which both operate, but most importantly the implicit evaluations of the subjects. Through participatory observation, a caring action full of acts of love is achieved, full of the will to care for and realize the other, which will allow the observer himself to say that he has lived actively, that is, that he has really lived.

- Supervision of cases (health field) and of prototyping/manufacturing work on aids (technology field).

The supervision represents an operative practice that find applications in multiple areas. In the context of the helping professions, the term supervision has been used to refer to the process of reflection learning, verification and evaluation that develops



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[Go to index](#)

through the relationship between an experienced professional and one or more practitioners in the field, during a training course or in the course of professional activity. This approach is also applicable in contexts beyond health care since it provides the opportunity to rethink the methodological choices made and to be able to benefit from help in connecting theoretical knowledge, the more or less explicit criteria that guide professional action and one's own operational choices, the need to identify professional tools that can be useful in the different methodological steps and, finally, the need to compare oneself with one's colleagues.

This methodological approach was chosen since it allows for: understanding whether and how interventions work, bringing out strengths and weaknesses, and identifying strategies for improvement.

So, methodological supervision is a tool available to individual professionals, groups, or work teams, which promotes the development of their own knowledge and resources in flexibly coping with the processes and relational articulations of a complex reality, in relation to the challenges from the users and the organization. It is characterized as a safe and protected space in which professionals rethink their goals, objectives and ways of working, in order to review and methodically reevaluate their professional actions: through the description of what is done and the ways in which interventions and relationships are built, professionals have the opportunity to reflect on the effectiveness of their operational choices and to carry out constant monitoring of the quality of the services provided (system of evaluation and self-evaluation in itinere).

2.3.2. Outcomes and results

Using the methodology of participatory observation, Dr. Caterino had the opportunity to find the effective implementation of the DEEP model at the Villa Delle Magnolie Clinic: by observing the relationship between patients and the professionals who in various capacities deal with their rehabilitation (speech therapists, dietitians, occupational therapists, physical therapists, neuropsychologists), two main strengths emerged:

- health professionals who participated in the pilot training showed a greater propensity to relate empathetically and prosocially and to motivate in the most correct way (meaning by analyzing what stage of change patients are in and the associated cognitive and behavioral processes) their patients to undertake healthier life paths (e.g., exercise, decide to diet etc.);
- after the training, professionals, thanks mainly to the presentation and explanation of the bio-psycho-social model and the ICF, have increased their knowledge and skills in relation to the construct of disability; this has enabled

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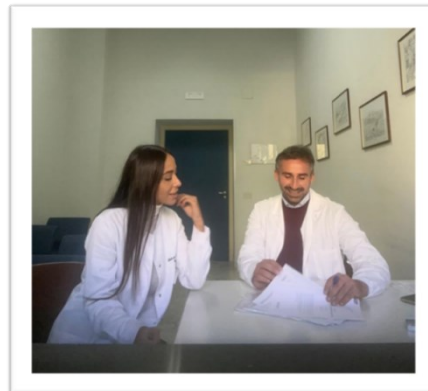
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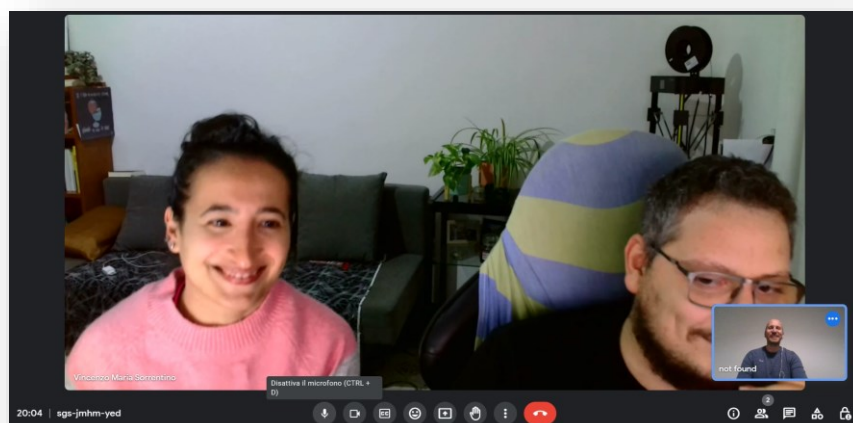
[Go to index](#)

them to become aware of the actual needs of patients (not only the primary ones) and to establish a helping relationship that overcomes a caregiving and asymmetrical view.

Using the methodology of case supervision, this approach was crucial for both the health care and technology professionals.



Dr. Caterino made it available for the professionals in the DEEP pilot course to supervise the cases they follow in the clinic in light of the DEEP model; through this opportunity, the stories of patients with disabilities were examined in a shared way and strategies were found to resolve any difficulties in taking care of the patient. From these supervision meetings, held at Dr. Caterino's psychological counseling room, it emerged that the DEEP model allowed for the enhancement and consolidation of both soft and hard skills examined, but one variable that considerably affects the effective implementation of the model is that of the time factor. Professionals often complain that they do not have enough time (due to shifts and the number of patients to be cared for) to be able to use the model comprehensively.





[Go to index](#)

Dr. Antonio Mele used this methodology with makers who had created and realized the aids with 3D printer to examine if the aid was useful by examining not only the technical function but also the importance of customizing each aid according to both the physical and emotional needs of the patients. Through such meetings held both online and at the HUB location, makers had the opportunity to make further modifications of the aids according to different variables: age, sex, performance expectations, self-image modification, type of disability, and characteristics of the aid (quality, function, aesthetics).

2.3.3. Next steps and lessons learnt

The supervision meetings conducted using the two methodologies described above provided insight into additional aspects related to the DEEP model. What the supervisory referrers learned through the meetings carried out by employing the methodologies described above are that:

- The DEEP model is truly effective when implemented in one's own work context. In fact, this model was also tested by professionals once the pilot training course classes were over. This feedback is indicative of the fact that DEEP model is also able to capture the training needs of the target professionals who voluntarily decided to continue using it in their work context as they found it useful and effective for relating to and working with their patients.
- Despite the willingness to use the DEEP model in its comprehensiveness, there are some critical issues related to the implementation of this model in the work context: professionals often complain that they do not have enough time available (due to shifts and/or the important number of patients present) to adequately use the methodological and operational models present in the model. In addition, they show difficulty in sharing the learned model with other colleagues who, not having participated in the DEEP pilot training course, do not understand the benefits of a holistic multidisciplinary approach that enables them to overcome the caregiver view still present in the world of disability.
- The internalization of this model by the target professionals (health professionals and makers) has generated a real change of perspective not only in the relationship with people with disabilities, but also in the professional relationships between colleagues and professionals belonging to different educational backgrounds. This aspect has affected the propensity and ability to manage the care of a person with disability, adopting a multidisciplinary point of view and



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[Go to index](#)

restoring dignity and uniqueness to the patient himself. Teamwork is definitely the outcome that comes most from such learned awareness.

2.4. Laboratory activities

2.4.1. Requests and needs addressed

The Laboratory activities carried out during the project were designed to help the professionals involved to broaden their skills and DEEPen the topics of design, development and prototyping of aids and devices useful to meet a patient's needs, co-design activities to identify adaptable, customised or even realised from the beginning as more effective aids, improving the quality of life of people with physical or cognitive disabilities while respecting their unique needs. During these activities, the user group made up of healthcare professionals and makers were involved in the co-design and prototyping process, so it was a time to DEEPen and apply the practical knowledge acquired during the training activities, from brainstorming to come up with innovative solutions to the use of 3D printers for prototyping. The brainstorming activity between the users, the trainer and the tutor resulted in the identification of some thought-out project ideas, (the technical feasibility and scenarios were then assessed, following the outline /present in the DEEP manual). In the brainstorming phase, the contribution of healthcare professionals was relevant, with their know how, acquired during years of working in direct contact with patients, they were able to transfer to the other participants the patients' needs and requirements, but above all the problems they encountered and encounter every day during their work using classical approaches and instruments, and the need to design ad hoc aids for each patient that also respond to the latter's secondary needs, giving added value to the therapy not only in terms of motor rehabilitation but also in terms of psychological rehabilitation, helping the patient to overcome the limitations of their pathology and acquire greater autonomy in performing daily actions. During the workshop activities, four needs/requirements were identified for which as many aids were designed and prototyped using the 3D printer:

- People who live with only one upper limb. For these people, it is in fact complicated to perform a number of actions that would require the use of both arms, such as opening cans, tying shoes, wearing jewellery, dressing, etc... . In these cases, it is often the case that people with only one arm help themselves with other parts of the body, such as the legs or the mouth. Observing these behaviours and these kinds of actions, it was thought to devise an object that could support these people in a specific context: the bathroom. Here it is necessary to use products for one's own hygiene and



body care, which are often small and unwieldy and above all difficult to open and use. A very concrete example are make-up products, which consist of very small and blunt jars and containers that are difficult to lock.

- Patients with motor impairments of the upper limbs who have difficulty hanging objects and making simple movements. The area of development is, like the previous project, make-up; in fact, this aid is designed to allow those with motor disabilities of the upper limbs to be able to use paintbrushes, pencils, brush in such a way that the patient can apply make-up independently and stimulate them to take care of their body.
- Spatial neglect patients, in the Co-design phase, healthcare professionals highlighted the need to design a device that would support the patient in the final phase of therapy and for daily post-therapy activities, which are often home-based therapies, so the possibility of having a wearable device that is minimally invasive gives support and an important contribution to the patient's path towards rehabilitation.
- Patients with paraplegia, polio, amputations, limb impairments and intellectual disabilities. For these types of people, an aid has been developed for playing table football, a game-sport that can be played by athletes with different disabilities. Competitions can be played while sitting in their wheelchairs, possibly with the aid of a cushion as a booster, using special 'sitting' tables: lower and with 'more space between the table legs' than those used by able-bodied people. The developed aid falls within the typology of aids to compensate functional limitations, cognitive, rehabilitative or educational aids, the project concept is to create a product to facilitate the use and play of table football at a stage even considered to be only the initial approach to the game. In which devices that can be installed on the 'little men' in the playing field allow easier control of the ball and improve the ability to intercept it.

2.4.2. Activities performed

The laboratory activities were carried out between the Villa delle Magnolie Clinic and the HUB SPA, during which we got to the heart of the field experimentation and application activities of what had been acquired during the training course (during these activities there were some difficulties, especially with the health professionals in getting them to manage the digital fabrication tools). The activities were



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[Go to index](#)

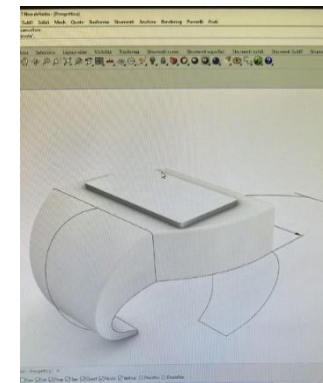
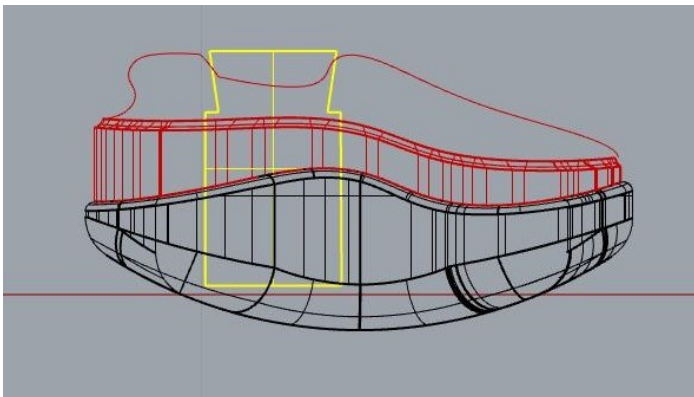
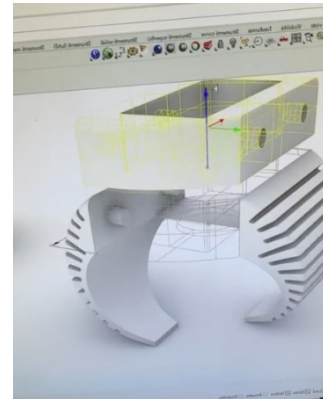
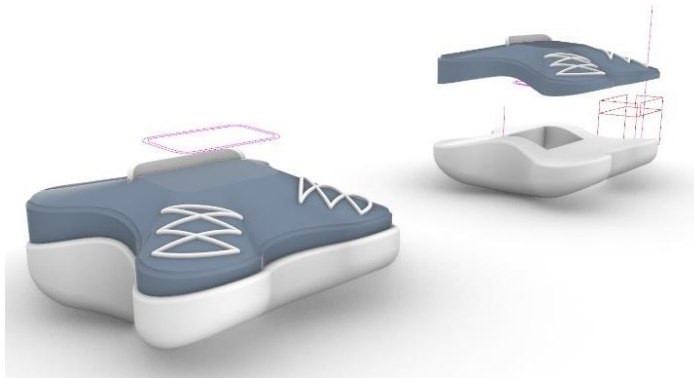
developed with a technical-practical-applicative approach, dividing the users into small working groups that were given the task of reasoning on a type of disability among those identified during the brainstorming phase, analysing the needs of patients and rehabilitation activities so as to create and prototype ad hoc designed aids to optimise therapies and improve the performance of daily activities independently. Subsequently, the workshop activities continued with the individual groups who, together with the trainer and tutor, met in blended mode and identified some innovative solutions that could be realised with 3D printing or open-source hardware/software devices. The working sessions with the individual groups were alternated with plenary sessions of discussion between the working groups, which helped to add further value to the projects developed by the individual groups. After defining the design ideas to be produced and the feasibility of prototyping/production with digital fabrication and stampnti3d tools, the participants entered the phase of transforming the sketches and design drafts into 3D models and of identifying all the aspects that would be useful to make the devices easy to use. In this phase, the role of the designers-makers was fundamental, as they showed and shared their skills in this area, enabling the other participants to learn operationally what the potential of digital design is, such as the possibility of visualising the object in all its parts, in a three-dimensional space that emulates real space, which allows the aesthetic-functional details of the product to be refined and optimised more quickly and sustainably than the classic methods that envisaged the realisation of physical mock-ups. Finally, the activities flowed into meetings at the Makerspace where the participants, supervised by the tutor and trainer, were able to independently use 3D printers and digital fabrication technologies to prototype the design solutions developed. In this phase, they were able to better understand the differences between the materials that can be used with the 3D printer, how the individual settings of the slicing software affect the success of the print, how to set up the printer before printing, and finally the care and maintenance of the individual mechanical and electronic components. The prototypes made allowed them to test the aids and obtain immediate feedback from the participants with disabilities, so that they could optimise the 3D models and print the final versions. During this workshop phase, there was a fervent activity of confrontation and sharing of skills among the group participants, especially the healthcare professionals who already showed a strong curiosity and interest in the world of additive manufacturing and 3D printing from the beginning of the project activities. This confrontation thanks to the expertise of the makers in this field was constructive and of high value for the activities carried out.



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[Go to index](#)

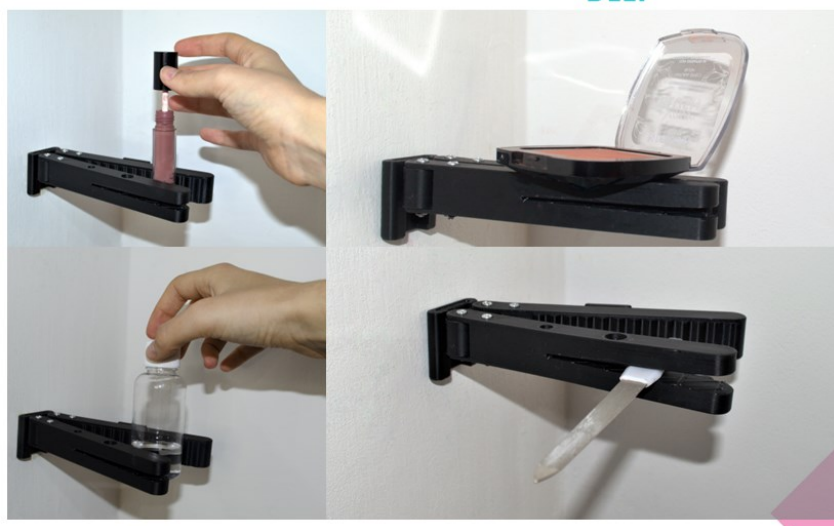
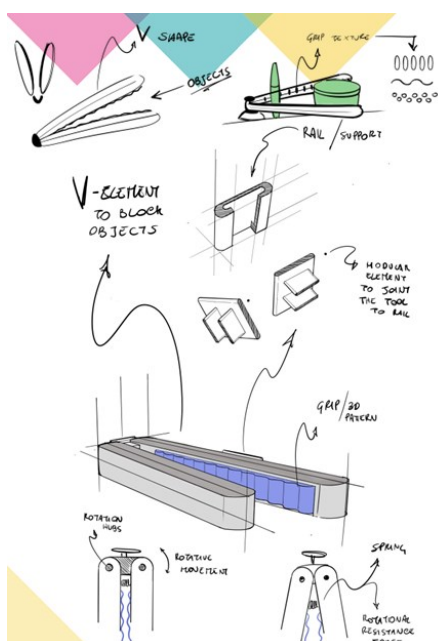


2.4.3. Results and lessons learnt

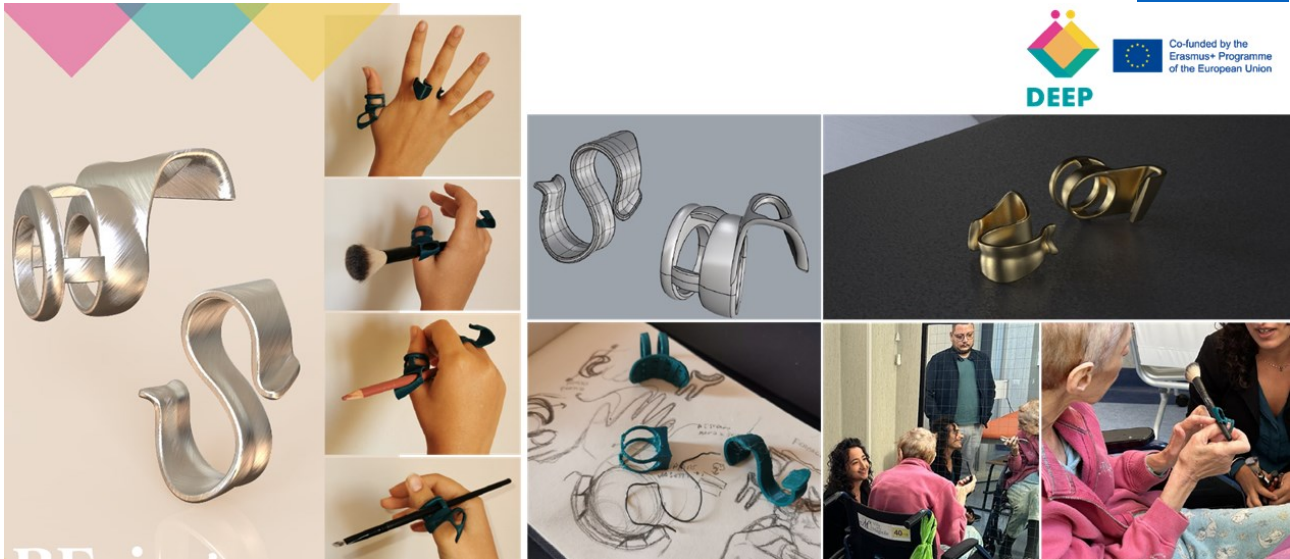
The Laboratory activities stimulated interdisciplinary discussions among the participants, who had the opportunity to share their knowledge and skills with each other. It was an activity that also resulted in the personal and professional growth of the participants, which enabled healthcare professionals, makers and patients to discover new working and everyday life scenarios. The co-design and prototyping activities gave the healthcare professionals the opportunity to discover and acquire a design methodology typical of designers, which is based on a creative approach with a vision to investigate and find solutions often beyond the box, applying the scientific method of Design Thinking, and at the same time the Makers were able to acquire and discover the scientific and human approach used by healthcare professionals in the rehabilitation and support activities for the patients they assist. Moreover, for the patients it was a moment of discovery and acquisition of new knowledge, especially of the design process behind each product and the innovative prototyping and 3D printing technologies, but above all they were able to experience moments of light-heartedness that contributed positively to their psychological state.

In addition, the following devices were produced and tested:

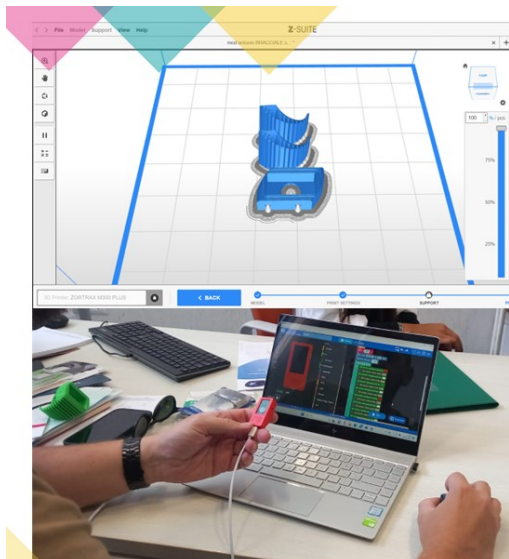
- A support tool for people living with only one upper limb, entirely 3D printed, which aims to clamp, support, and hold these products and objects for ease of use. It consists of two main parallel horizontal elements, connected on one side by a third element in such a way that they can perform rotary actions. To counteract the free rotational movement of these elements there is a spring that limits their opening, generating a 'gripper' effect. The two main elements also feature a silicone texture on the inside that creates a grip effect. The intended function is to push the products inside the two parallel elements, which, through the 'pincer' effect, will block the object, making it possible to open it and any other movements necessary for its use. The tool also features other small slots and holes that serve the same purpose: to block or hold objects, but smaller or thinner. The object is intended to be fixed to the wall: this is possible thanks to a fourth element that is screwed and locked to the wall and within which it will be possible to fit the instrument in different orientations so as to obtain multiple configurations of use.



- An aid to assist motor disabilities of the upper limbs, enabling the patient to be able to use make-up tools. This aid consists of a series of "ring" braces that act as supports for the instruments used for make-up.



- A smart device for Spatial Neglect i.e. a wearable smart device in the shape of an armband made with a 3D printer, an easy-to-use, open-source IoT development board, and a vibration actuator. The device using sound, light and vibration signals helps the patient to bring attention to the side they ignore or use less because of their pathology.



- A Grow up support made with a 3D printer to facilitate interception, control and straight shot, act as a counterweight to allow automatic positioning of



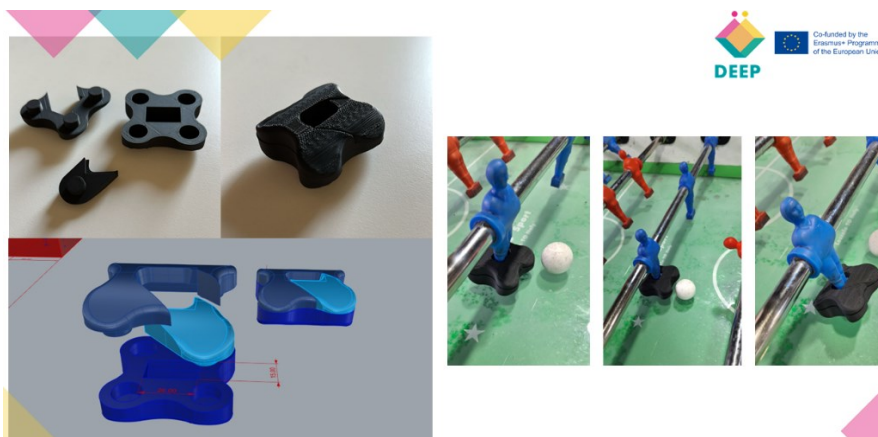
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INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

the cairn in an upright position, decrease rebounding and slow down the ball, but above all allow for a reduction in the space for passing the ball between players, due to the minimal space required and the consequent reduction in cue movement. This product has a high degree of adaptability that allows the application of standard joints to homologate the boot to different cairn designs.





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[Go to index](#)

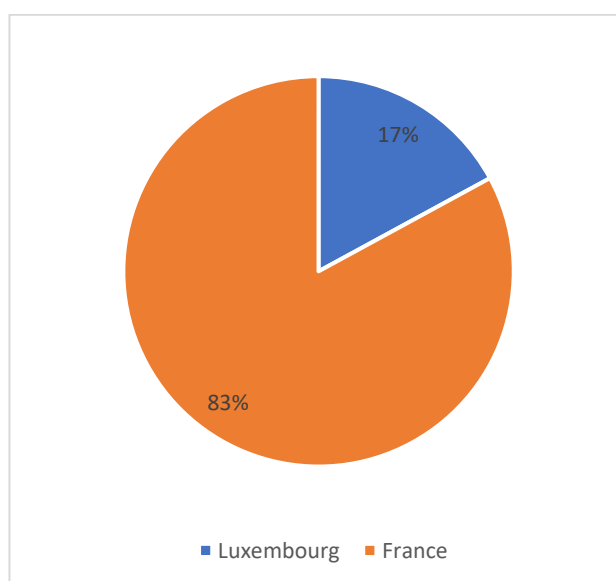
3. DEEP implementation in Luxembourg and France

3.1. Local pilot training

3.1.1. Stakeholders involved

In the preparation phase of the training, Technoport had exchanges with Info Handicap in Luxembourg as an associated partner in the DEEP project. Since August 2012, Info-Handicap has been accredited as a continuing vocational training centre by the French Ministry of Education and Vocational Training. Several hundred people a year have benefited from the awareness-raising or practical training courses of Info Handicap on e.g. welcoming people, diversity, transport for all, tourism for all, communication, accessibility, "Design for All", and more. Info Handicap is present in both France and Luxembourg and is a reference and accreditation body in the two countries. The discussions with them made it possible to certify the training content as suitable for vocational training purposes from a general point of view as well as the specific goals of the DEEP project and the direct participants foreseen in the future pilot training in particular.

The cross-border pilot course brought together a total of 41 participants from Luxembourg and France. For the participants, it was an opportunity to meet, discuss with a wider community of practitioners and compare approaches and practices, as well as acquiring technical knowledge and information from the trainers.





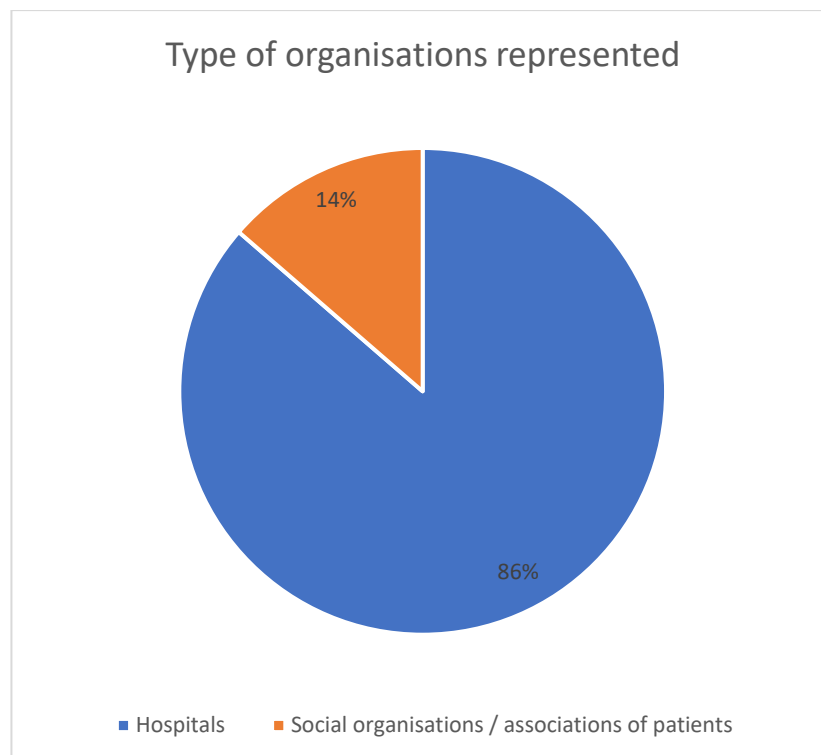
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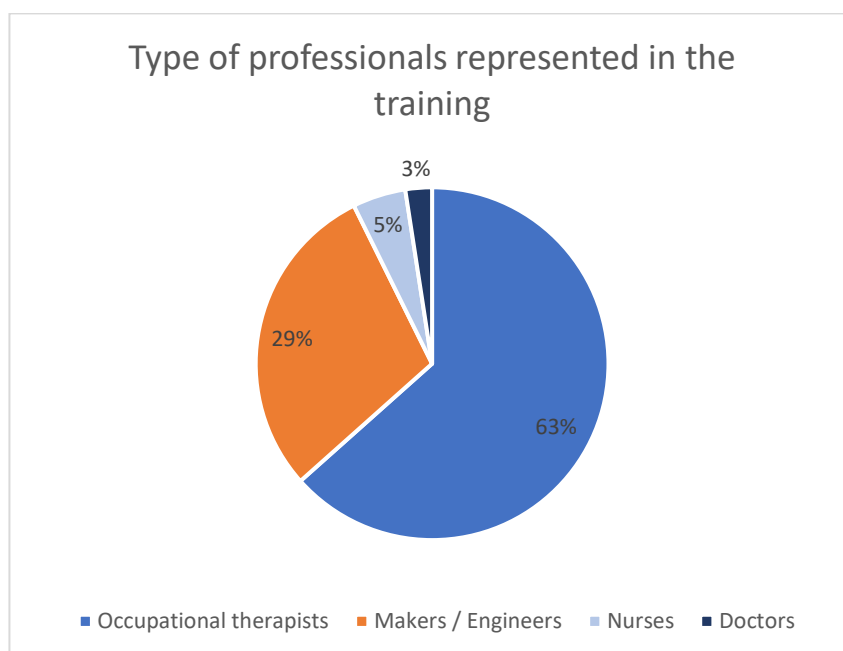
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The participants were recruited by Technoport and some of its associated partners in the project, namely the Rehazenter and Kaplab. Representatives from those two organisations attended the ToT training organised in Naples earlier in the project and were subsequently very actively engaged and involved in DEEP's local activities.

In total, 22 different organisations were represented in the training, most of them being rehabilitation clinics but also foundations active in the field of disability and associations of patients (e.g. Association des Paralysés de France, Croix Rouge Française).



Most participants had a medical background (occupational therapists, doctors, nurses) but technical profiles (i.e. engineers and makers) were however represented in a sufficient number to ensure a good sharing of knowledge as well as a good mix of expertise, practice and experience between the participants. Those profiles were recruited among the engineering staff of the clinics but also people with technical expertise from the NGO sector. Mechanical engineering, but also simulation software, electronics and IoT were among the skills represented beyond the core topic of 3D printing.



Though the pilot training targeted in principle only direct targets of the project (i.e. healthcare professionals and makers), a patient from a clinic provided his return of experience and some very inspiring insights on the needs and the both possible and necessary integration of the patients in the therapeutic process as well as the decisions taken in terms of individual services and personal aids provided.

It was the initial intention of Technoport to perform a pilot training with students in healthcare as well but this activity has proved very difficult to integrate in practice in the academic calendar for the related curriculums. One participant to the pilot training however shared with the audience a project performed with some students in industrial engineering at the INP Grenoble that demonstrated the possibility to create partnerships with some engineering schools in the future in the fields of collaborative projects and design of technical aids. Opportunities and possibilities to foster collaborations between students and clinics were extensively discussed and shall be further explored by some of the French participants in the future.

3.1.2. Content of the training

Four trainers among the five ones that attended the ToT training in Italy were involved in the pilot local training. The content was based on the core material developed in the framework of the DEEP Project (state of the art, training modules from the ToT, handbook).



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[Go to index](#)

The pilot training was organised in Grenoble (France) in March 2023, for a duration of 2 days (17 hours of training in total). It was decided to have a physical meeting at a local rehabilitation hospital in order to allow informal networking and in-depth bilateral discussions not only between the trainers and the group of participants but also between the participants themselves. The same way, Technoport took the opportunity to bring together the trainees from Luxembourg and their peers from French institutions so as to generate inspiring exchanges between people operating in different regions and contexts.

A visit of the hosting rehabilitation clinic was organised at the end of the first day and led to discussions among the participants concerning their respective therapeutic infrastructures and rehabilitation equipment. The needs of the patients were discussed on the spot and the technical aids in use at the clinic in Grenoble were presented.

The choice of module content from among those available in the ToT was in line with the specific composition of the group, which was made up of 70% therapists and only 30% makers. The emphasis was therefore placed on the technical modules of the training (11 hours in total).

The disability and the bio-psycho social model, as well as the prosocial approach to disability, the transtheoretical model and stages of change were however presented to the audience and discussed.

Participants were encouraged to present and share their current practices and the challenges they face when dealing with patient communities. Inspiring stories were shared about the history, operating context, patterns and range of services offered by the participating organisations.

The theoretical concepts in DEEP (pro-social behaviours, co-creation approach) but also the key topic of the needs of the patients were extensively addressed and discussed with the audience, based on practical examples. The participants confirmed the lack of suitability of the standard technical aids, often abandoned as they were too difficult to use and not adapted to the patient's specific body and disability.



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[Go to index](#)



The DEEP project was presented and generated a very high level of interest among the participants, confirming the need for greater knowledge and awareness around the topic of disability care with an emphasis put on the need for a multidisciplinary approach and the fulfilment of unmet needs.

A discussion on the economic and governance models supportive of the DEEP approach that could be implemented by healthcare organisations was moreover handled during the training in the framework of a specific session.

Finally, a wrap-up session at the end of the training allowed to identify ideas for further topics and actions.

The concept and the applications of 3D printing and its related technologies were thoroughly explained. The tools that were considered by the trainers as a key and necessary complement to the 3D printers were extensively presented and discussed. A presentation and demonstration of a 3D scanner was thus performed on the second day of the training.

3D modelling was identified as a weakness in terms of technical skills and the ability of the carers to start 3D printing technical aids in a real operational context following a process of co-creation needed to be boosted. An interest and needs for a specific 3D modelling training emerged from some healthcare professionals from Luxembourg. A further internal training session in the field was therefore organised at the Rehazenter in April 2023 with a group of staff members, all of them physiotherapists in the fields of occupational therapy and neurology.



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[Go to index](#)



3.1.3. Evaluation and feedback

The following graphs illustrate the impact induced by the training activities in Luxembourg and in France, by category of knowledge.

The participants being for most healthcare professionals specialised in rehabilitation, disability was obviously not the topic where the most new skills were provided (+18%), but a significant change could be induced in contrast in the field of the motivational approach (+38%) and to a larger extent in relation to 3D printing and the related technologies (scanning, modelling tools) (+42%).

With regard to prosocial behaviour, it seems that participants had an intuitive understanding of the concept, but were able to learn more about its implementation, the methodology and the necessary skills thanks to the content and tools provided by our partner UAB (+22%).



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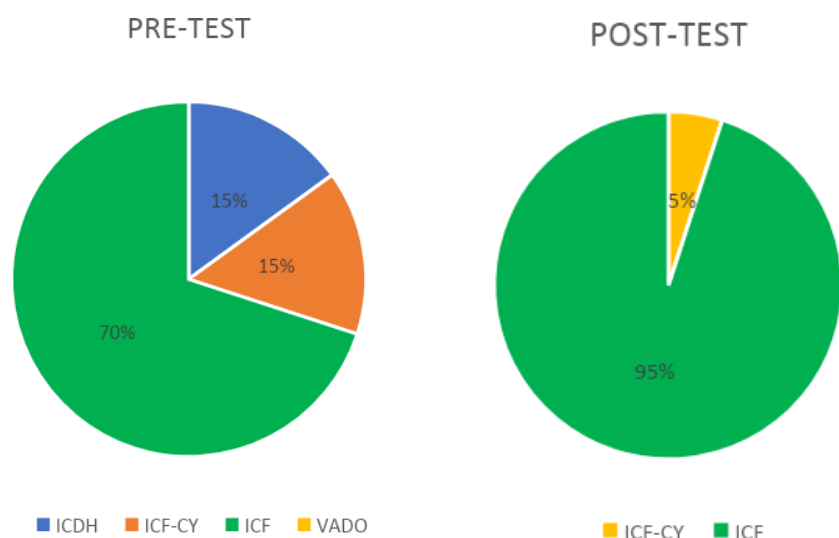


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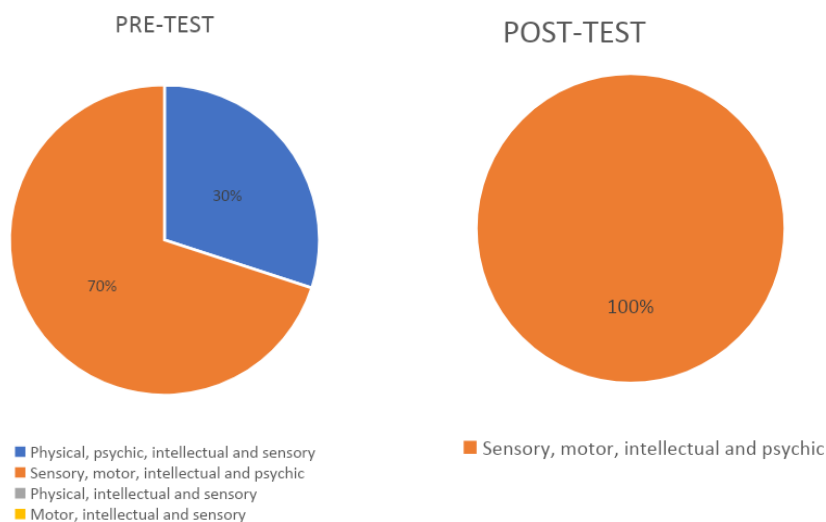
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Thematic area 1: disability

Item 1: *what is the main international classification system on disability ?*



Item 2: *how are disabilities categorised ?*



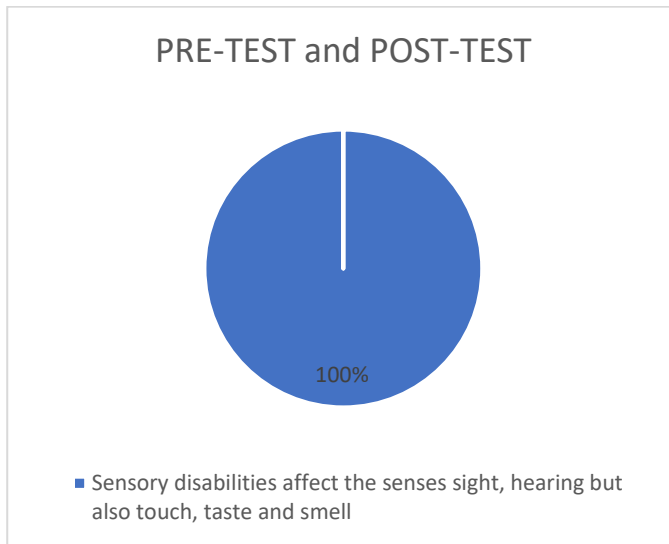


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[Go to index](#)

Item 3: *identify the correct statement*

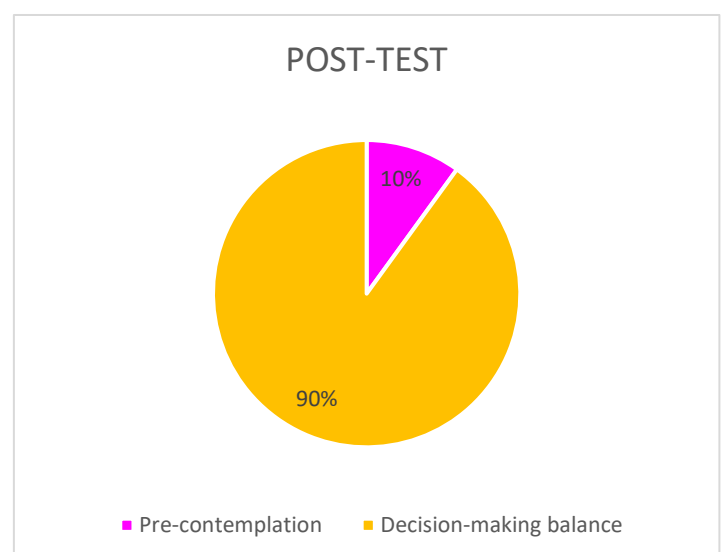
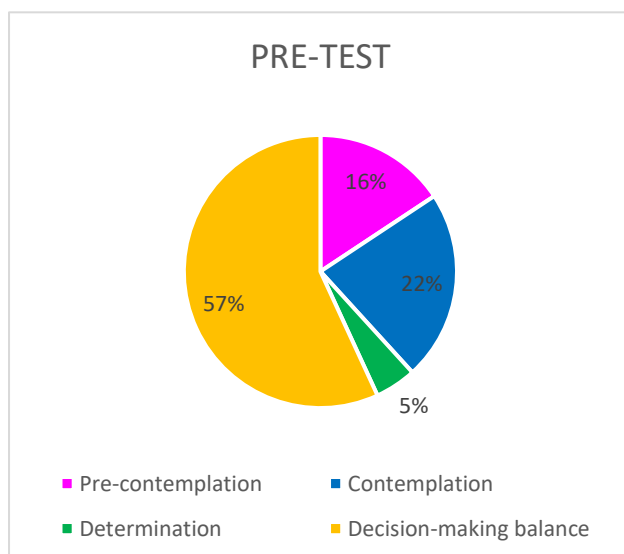


- Sensory disabilities only concern eyesight and hearing
- Sensory disabilities only concern eyesight and smell
- Sensory disabilities affect the senses sight, hearing but also touch, taste an...
- Sensory disabilities affect the senses...

Thematic area 2: motivational model

The participants didn't have full prior knowledge of the motivational approach but understood quickly the concept after being trained on it.

Item 4: *in the trans-theoretical model, which of these stages is not part of the stages of change ?*





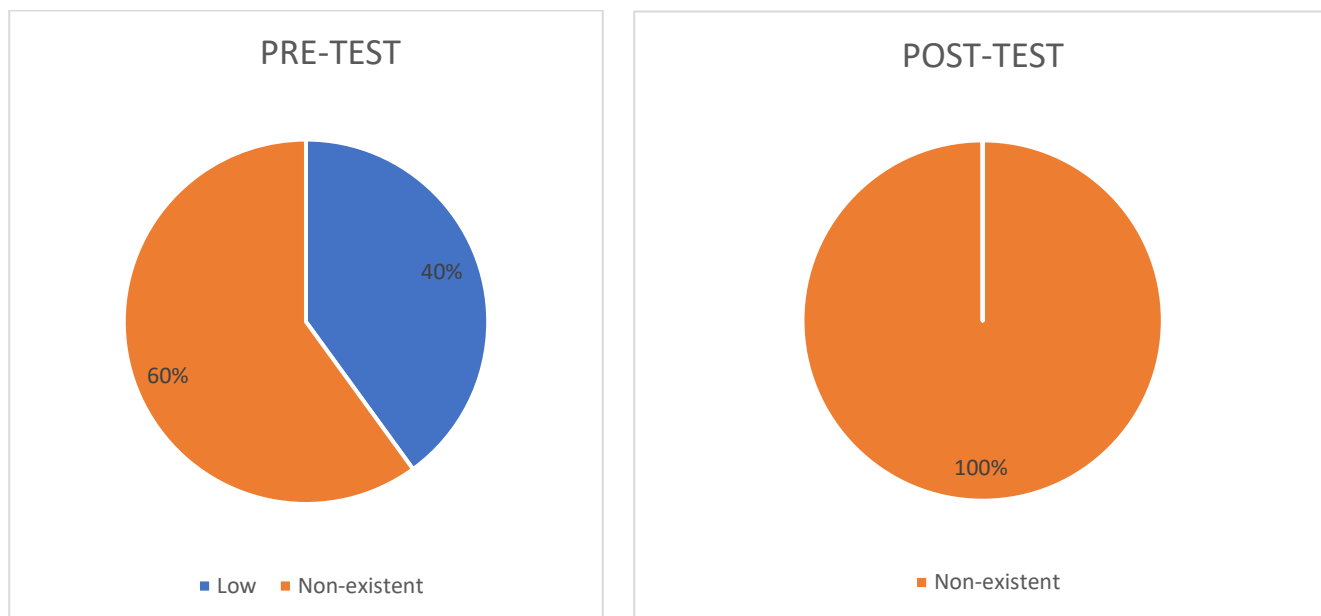
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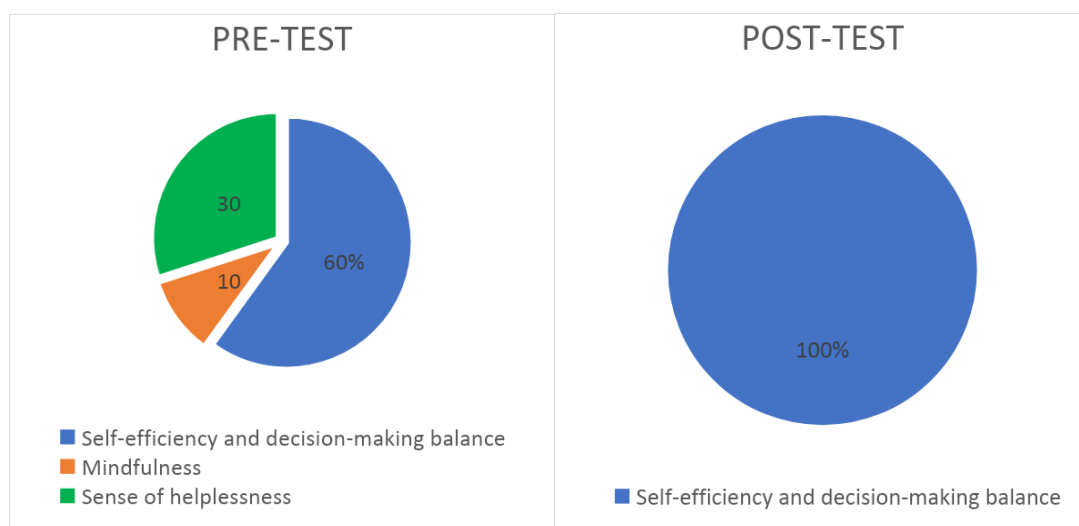
INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

Item 5: *in the pre-contemplation stage, the decision-making balance is:*



Item 6: *in the trans-theoretical model what are the factors affecting change ?*





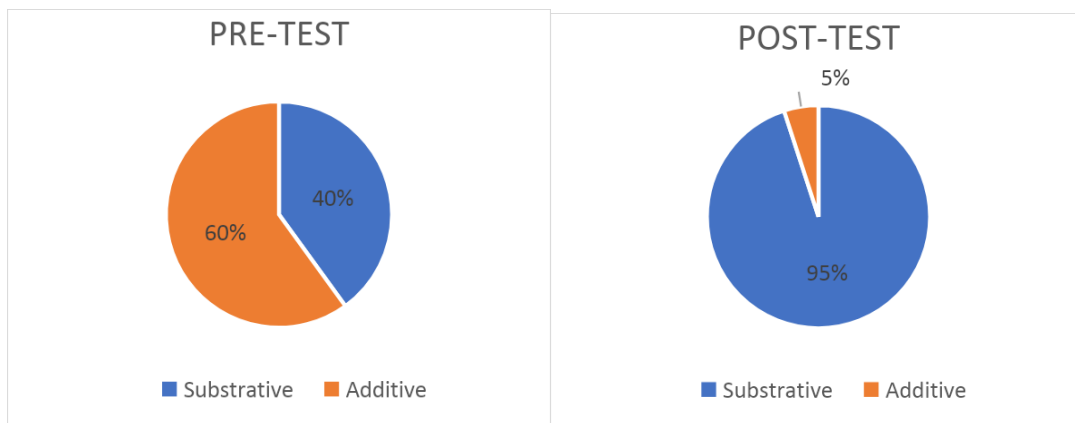
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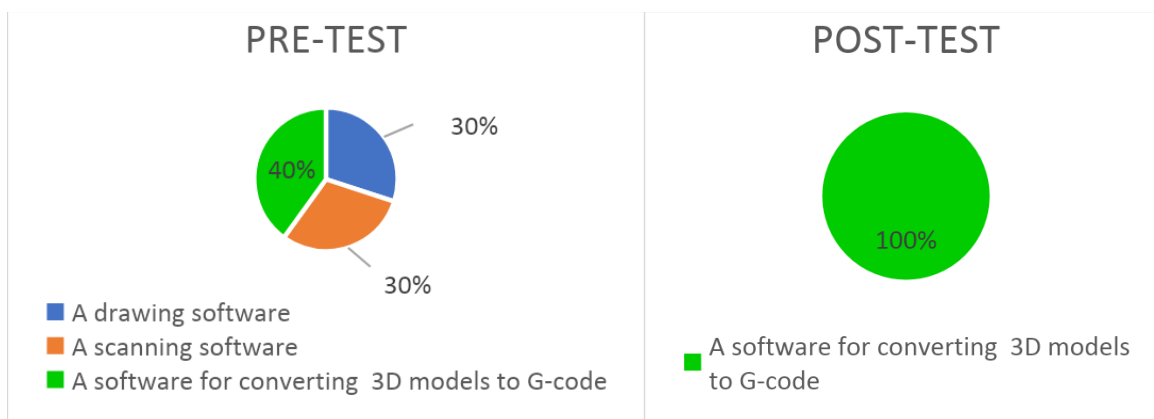
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Thematic area 3: 3D prototyping

Item 7: 3D printing is a manufacturing technology:



Item 8: *What* is slicing software ?





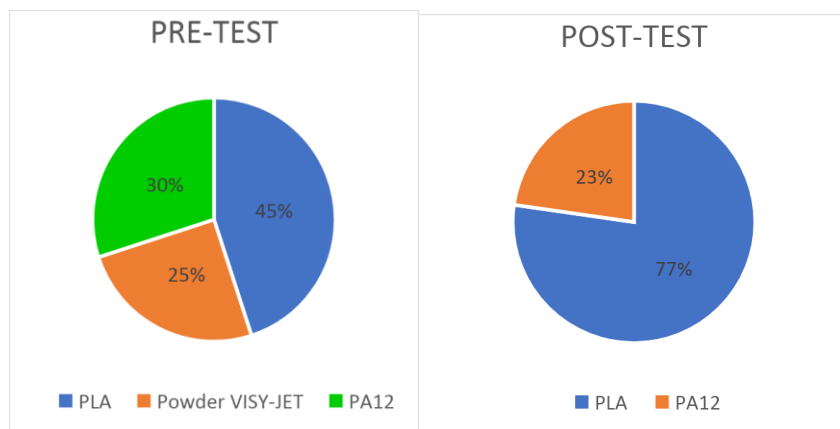
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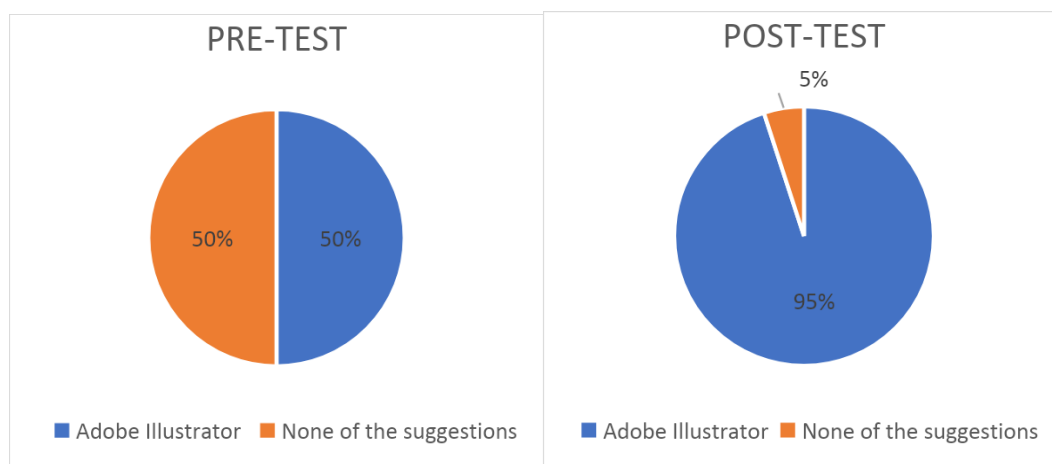
INAPP
PUBLIC POLICY INNOVATION

[Go to index](#)

Item 9: which of these materials is used in FDM 3D printing ?



Item 10: which among these software is necessary to use for the preparation of vector graphics ?





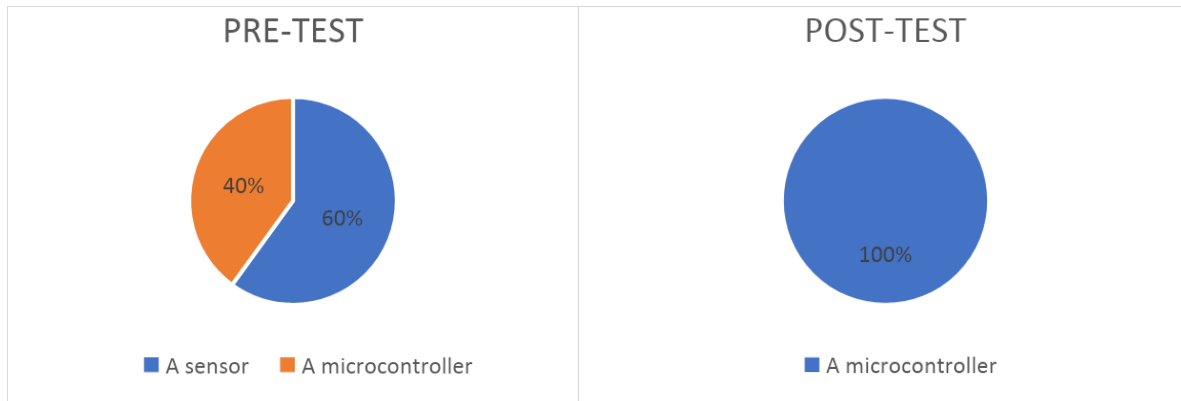
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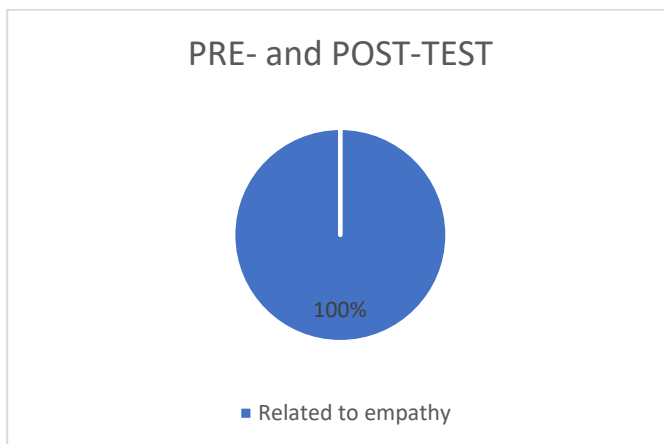
[Go to index](#)

Item 11: *Arduino is:*

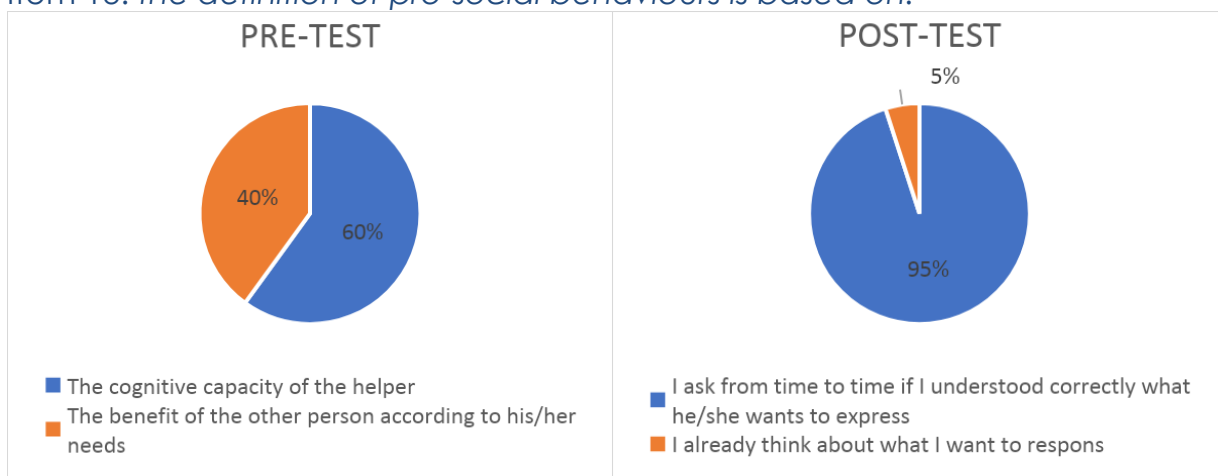


Thematic area 4: pro-social behaviours

Item 12: *prosocial behaviours are:*



Item 13: *the definition of pro-social behaviours is based on:*



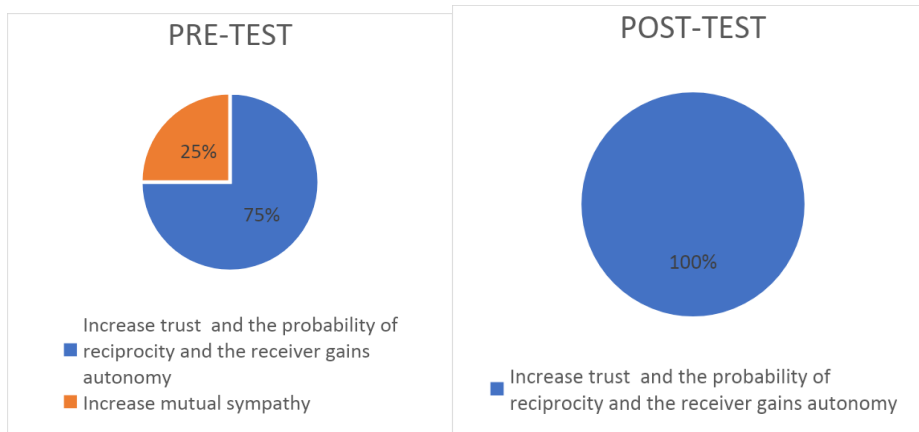


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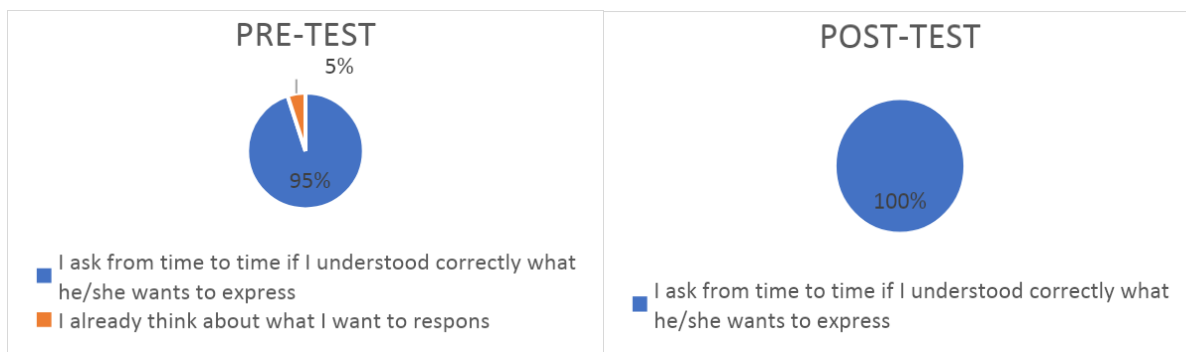


[Go to index](#)

Item 14: *which are important criteria for effective prosocial actions ?*



Item 15: *when listening actively to a person:*



3.1.4. Recommendations and lessons learnt

The practical use of the holistic approach in the DEEP project to foster a better understanding and management of the specific needs of each patient turned out to be a very relevant and inspiring subject, with a very good complementarity between the training modules and the topics discussed.

As far as the technical training is concerned especially, it is recommended to create an as practical as possible experience, and present some real use cases to the audience.



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[Go to index](#)

As part of the introductory Prosocial Participatory Visualization exercise, the main positive element was the strong interest and motivation from all participants in supporting the needs of the patients and empowering them in their individual lives and activities, the main constraint and concern being the workload of staff in healthcare establishments, which makes it difficult to step back from all the routine tasks that have to be performed on a daily basis.

Lack of time, human and/or financial resources and sometimes a lack of adequate support from the management were mentioned as an issue. This has motivated Technoport to include and discuss that dimension in the supervision meetings, working on the organisational models and service offers that can be provided by healthcare institutions active in the field of rehabilitation and trying to induce some strategic shifts.

The final session in the training aimed at gathering further thoughts and ideas from the audience was very useful to identify some modules that may be added to the ones that had been already developed in the project in the context of the ToT. It is recommended to include such a discussion in the trainings, giving enough time to the audience for brainstorming and providing feedback on what would possibly be relevant to have in terms of further skills.

3.2 Follow-up meetings

3.2.1. Context and methodology

The follow-up meetings were organised immediately after the pilot trainings. The format was a very open and interactive discussion around the questions agreed upon between the partners and provided in Annex II.

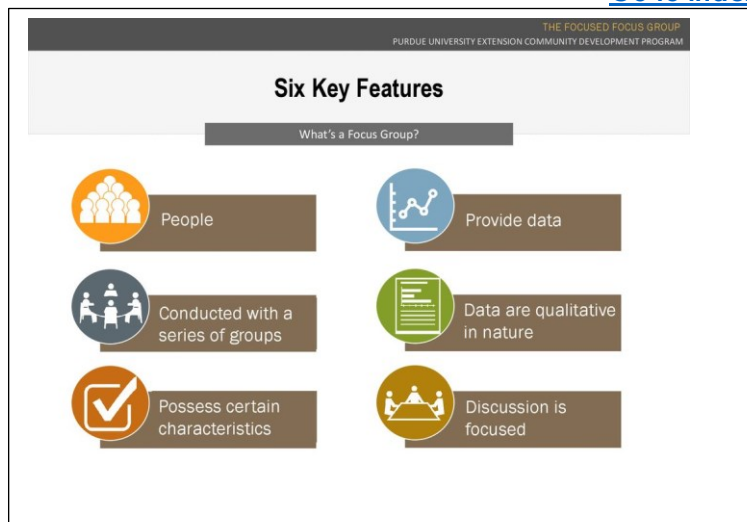
As already mentioned, the organisation of a physical meeting allowed informal networking and interactions between some small groups of stakeholders from different organisations, which was an ideal context for performing activities based on the focus group methodology that was chosen in the DEEP project. The option turned out to be very relevant and efficient in order to gather feedback.



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[Go to index](#)



3.2.2. Discussions and feedback gathered

How has your relationship to the disabled people evolved after the DEEP training ?
What has or will possibly change in the near future ?

The strong link created between the end users, their occupational therapists and the technical advisor during the envisaged co-creation activities should enable better appropriation of the technical aids offered and a better understanding of the needs.

The benefits of the DEEP approach for the stakeholders involved can be summarised as follows:

- patients: more expertise and power over one's disability and personal situation,
- healthcare professionals: greater effectiveness of the therapy, better understanding of the patient taking into consideration the non-medical aspects and needs that can greatly influence a patient's condition, possibility to generate a positive impact and change from that point of view,
- makers and engineers: insights on the specific needs of the disabled communities, feedback on the relevance and user-friendliness of their technologies and designs, opportunity to learn and be trained in the field of inclusive design, happiness and motivation to innovate with a social impact.

For the healthcare professionals, it is clear that the relationship to the patients dramatically can change after entering into a co-creation approach allowing the customisation of the support and the possibility to extent and fully adapt the



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[Go to index](#)

technical aids provided, while from the point of view of the patients, it is a possibility to be empowered and regain control and confidence in their daily activities.

Increased compliance and motivation to engage into the therapeutic process is expected as well as a positive impact on the relationship between the caregivers and the patient, especially as far as external patients are concerned. The close relationship established with the patient can be easier maintained, encouraging the patient to share one's feelings, activities and the challenges experienced outside of the clinic.

- What is your current feeling about integrating 3D technology into your practice? What are the pros and cons of using technology?

The process of 3D printing is manageable for the public once they have been properly trained in the technique and have an easy access to a printer. The use of 3D printing at the clinic is very positively perceived.

Where further support from a technical expert is deemed to be required is mainly in terms of design and to know when a specific material is more adequate than another for a specific print. Those topics were addressed during the training sessions but further remote support should ideally be made available to the participants in the future if/when required.

The cons of 3D printing is the time needed to produce a technical aid. In terms of human resources, at least 0,5 full time equivalent (FTE) and ideally 1 or 2 should be allocated to the co-creation process to make it available to an as wide as possible community of end users. This is to be negotiated inside each organisation.

- What about networking and co-creating with other people ? Who would you consider suitable to involve in your activities in the future ?

Networking and co-creating with other people is very inspiring and powerful, not only in terms of ideas for a specific aid or design but also in terms of practical implementation of the DEEP approach in a daily context. Multidisciplinary gatherings are an opportunity to think out of the box and see the big picture. The three types of profiles involved in the DEEP approach are considered relevant. The combination of different backgrounds and skills is not only necessary to come up with a suitable aid but also very insightful from a personal perspective.

- How do you feel about your job and tasks after the training ? What has changed ? How would you describe your current thoughts and position ?



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[Go to index](#)

In a medical context, the transition from hospital to home is generally a very positive signal for all parties involved, but in a rehabilitation process, this stage can be very difficult for the patient, who may feel insecure once deprived of the therapeutic and psychological support received in the clinic. For the therapists who need to extensively prepare the patient and one's relatives to this very important step towards regained autonomy, the possibility to reassure the patient by offering further adapted tools and customised aids if needed any time in the future, either for daily life activities or social integration purposes is a very precious option.

Being able to respond better to patients' needs strengthens all stakeholders. As far as disability is concerned, this helps to change the mindset from a simple "problem-solving" approach to a virtuous circle.

- Is there anything you would like to add ?

A cross-border network of 3D practitioners in the field of healthcare is very nice to have. There is a strong willingness and interest in maintaining the links in the future and possibly performing innovation projects together with an exchange of best practices and expertise at international level.

3.2.3. Results and lessons learnt

The organisation of focus groups immediately or shortly after the local training is recommended to all future adopters of the DEEP methodology in order to make the most of this experience and to be able to capture the participants' feelings on the spot. Further follow-up activities will enable more feedback to be gathered afterwards, with a view to improving the quality of the training as far as possible.

In terms of acquired knowledge and skills, it emerged from the discussions that a key aspect of the success of 3D printing is the question of the initial design. It is recommended to have this dimension addressed and widely integrate it into future DEEP training courses.

As expected, the international approach and the opportunities for multidisciplinary networking have been one of the positive aspects of the training offered. In addition, even if some specific technical training courses can be made available online or taken individually, the exchanges between the stakeholders brought together in the same place constitute an essential added value for effective learning.

In terms of expertise, it is advisable to involve potential end-users as much as possible in the training programme and to allow them to contribute not only to the



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[Go to index](#)

practical laboratory activities but also to the 'theoretical' exchanges at this early stage of the co-creation process. This is what was done in the cross-border pilot training course in Grenoble and also by Hertin in the Czech Republic, with very positive results.

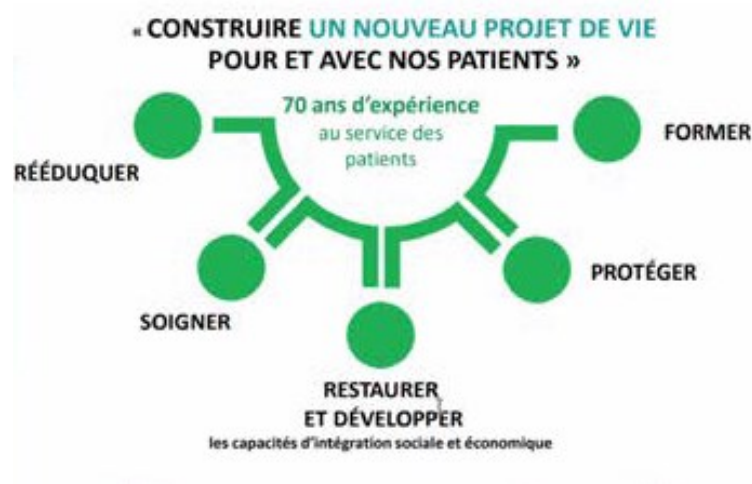
3.3. Supervision meetings

3.3.1. Context and methodology

Supervision meetings were performed both in Luxembourg and in France. Those meetings were the occasion of discussing the practices and changes induced in the organisations with the support of the DEEP approach but also to identify future needs and areas for improvement at the level of the organisations on the field.

3.3.2. Outcomes and results

The supervision meetings allowed to understand how the DEEP approach was implemented in practice and the impact it has had on the entire organisation. Indeed, the co-creation of aids induces a change of priorities and focus inside the healthcare institutions with an enlargement of what is considered important to fulfil and should be part of the treatment. Greater attention was paid by the institutions to the development of the overall quality of life of the patients and the opportunities offered in terms of social and economic inclusion, beyond the rehabilitation and medical core therapeutic missions that they have traditionally performed. That dimension was successfully integrated into the vision of the organisations in line with the DEEP model.



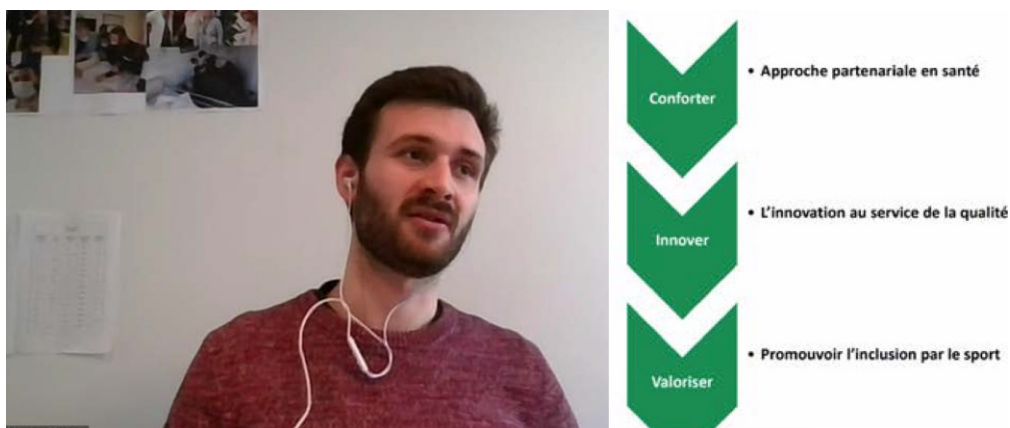
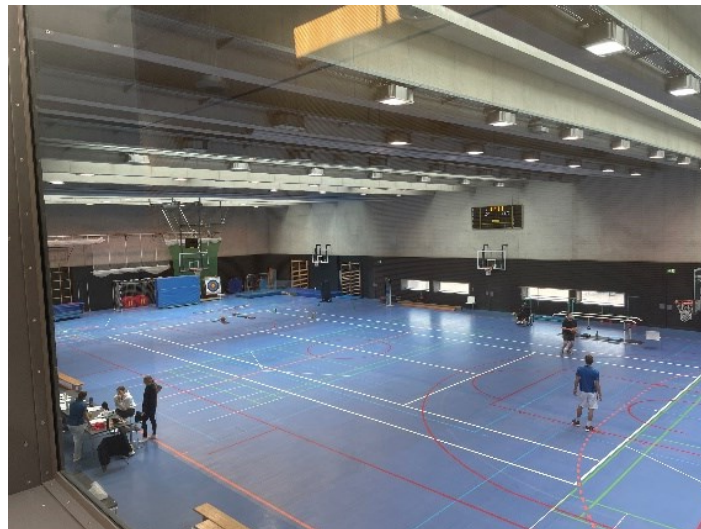


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[Go to index](#)

In both Luxembourg and France, sport and leisure activities have been recognised as an essential part of the therapeutic process, which can be successfully supported and encouraged by healthcare providers. The paradigm shift from the bottom to the top of the pyramid of needs has thus been successfully achieved, taking into account each patient's desires for emotional and social inclusion, in addition to one's medical needs in the strict sense of the term.



3.3.3. Next steps and lessons learnt

It is recommended to make the top level managers aware of the advantages of DEEP's holistic approach, its benefits and the way it can be smoothly integrated in the organisation's existing range of services and workflow. This is all the more important so as as long as there is no perception by their hierarchy of the need to



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[Go to index](#)

pay more attention to each individual patient, it is very difficult for the physical rehabilitation practitioners to organise co-creation activities, even though they could have a possible access to a Fab Lab and 3D printer. Whenever possible, it is recommended to couple the supervision meetings in DEEP with strategic roundtables and workshops where the service offer and model of the target organisations can be openly discussed and challenged, discussing the changes and improvements that can possibly be brought, as well as the potential impact. If this isn't achieved, the trained occupational therapists may face a conflict of interest when performing co-creation activities, not feeling supported and even eventually being blamed by their upper-level supervisor for the time dedicated to such activities, which can in this case be considered detrimental to the traditional care services and out of their core mission.

In terms of access to sports, partnerships with external clubs and associations are highly beneficial and the next steps in terms of dissemination may be to further target those communities of stakeholders, generating awareness among communities of sport practitioners about the possibilities offered by customised assistive devices and demystifying the challenge of integrating disabled people in their activities. To fully implement the DEEP approach, the multidisciplinary aspect is key and it is recommended to promote partnerships between different organisations. The involvement of the civil society beyond the care givers, patients and makers is highly recommended for a more inclusive approach.

3.4. Laboratory activities

3.4.1. Requests and needs addressed

Both in Luxembourg and in France, a number of needs were related to some daily basic tasks that were not adequately supported by the technical aids prescribed due to a lack of customisation, fit and suitability in terms of design or size.

At the clinic we worked with, the requests for customised technical aids were mostly related to some motor disabilities, the aim being the adaption of grip and/or the optimisation of gesture comfort for some patients with reduced range of movement in the upper limbs mainly (especially the hand), due to limited strength or movement disorders (tremors, parasitic movements, etc.). That induced needs for e.g. during a cooking activity, use of a personalised adapted knife, or during a writing activity, the use of a customised pen.

On a wheelchair, it was often requested to adapt the opening of the footrest or the braking system, or to customise the joystick for electric models. Another need and



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[Go to index](#)

request from the patients was to customise the handle on some commercially available mobility aids such as the Wheeleo walking stick (<https://wheeleo.be/>).

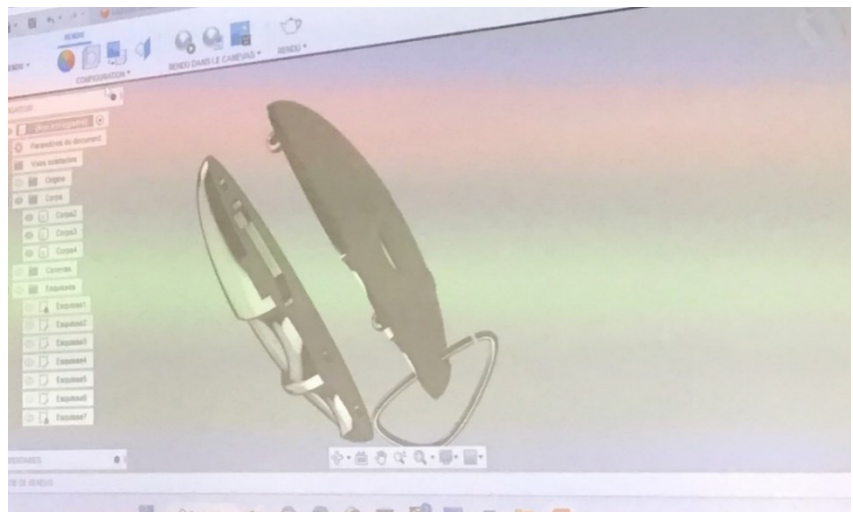
On top of technical aids related to daily life practical needs and/or mobility support, a use case related to the practice of sports was actually prioritised to be implemented in the co-creation activities performed in the project. That was a result of the innovative approach in DEEP which as already highlighted in the sections related to the results of the pilot training and the supervision meetings had tended to have a significant impact on the priority given to the different categories of needs by the healthcare practitioners, with a much greater attention paid to the social life dimension (leisure activities, sports, hobbies....).

3.4.2. Activities performed

For the lab activities in the project, the practitioners came up with some specific cases of the patients and the prototypes were made in close collaboration with them. The following practical aids could be successfully co-created:

1) design and 3D printing of a customised key holder

This patient had difficulties to turn this key as it was too small and therefore difficult to handle for him. The technical aid needed was a customised holder. That technical aid was an easy one to start with for the lab activities that could be successfully designed and 3D printed.



2) adaption of the control of a wheelchair

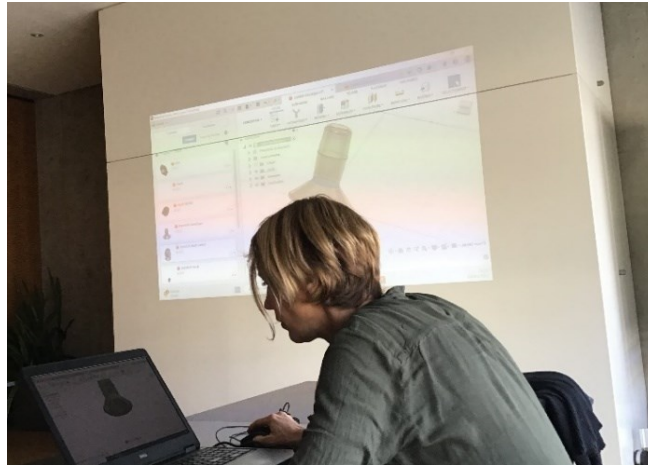


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[Go to index](#)

The scope was to replace the joystick of a standard wheelchair to allow a better control of the movements thanks to a new shape which made prehension easier.



The prototype was successfully completed, but the technical aid could not be delivered to the end user in Luxembourg due to concerns about the legal liability of the healthcare organisation following the change of a key piece of certified equipment. As a result, the focus of the following laboratory activities was on technical aids that were not intended to be integrated into an existing commercial product in the very sensitive but also crucial area for social integration of autonomous mobility assistance equipment.

3) Adapting a bow for use by a young patient

This use case was an opportunity to work on a larger piece of equipment. In line with the objectives of the DEEP project, it aimed to enable a patient with a right hand amputation to practice a sports and leisure activity. The idea was to design a custom 3D handle for a bow.

This use case was an opportunity to work on a larger piece of equipment. In line with the objectives of the DEEP project, it aimed to enable a patient with a right-hand amputation to take part in a sports and leisure activity. The aim was to design a customized 3D handle for a bow. An unsatisfactory solution had previously been attempted by the patient's therapists, namely the supply of a thermoformed-covered velvet glove.

The disadvantage of this solution was that the throwing experience enabled was not sufficiently precise and did not allow the patient to practice the sport in conditions similar to those of a person without a disability. The use of design and 3D

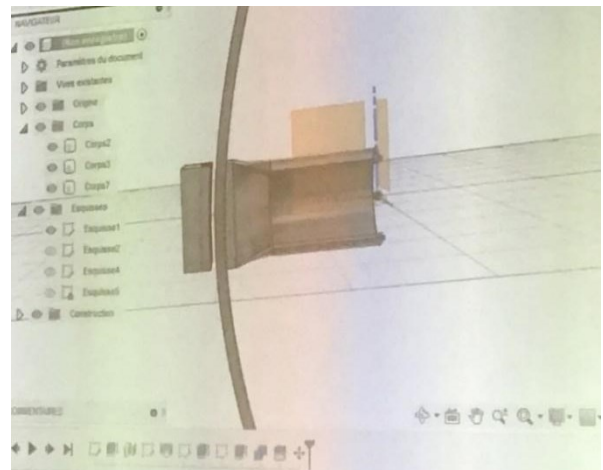
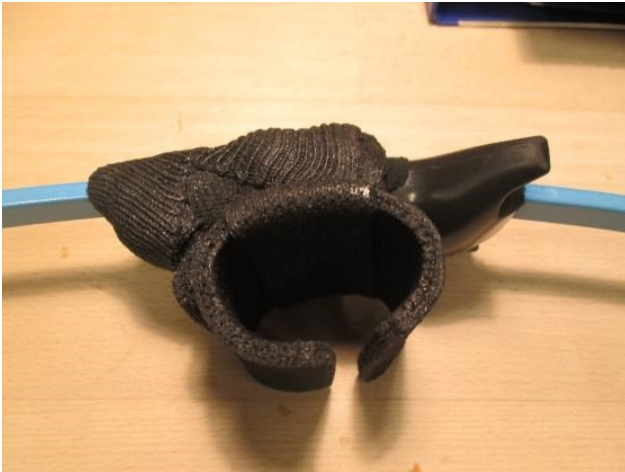


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[Go to index](#)

printing has enabled to provide a much more customized technical aid, and thus a much more complete and satisfying experience for the end user.





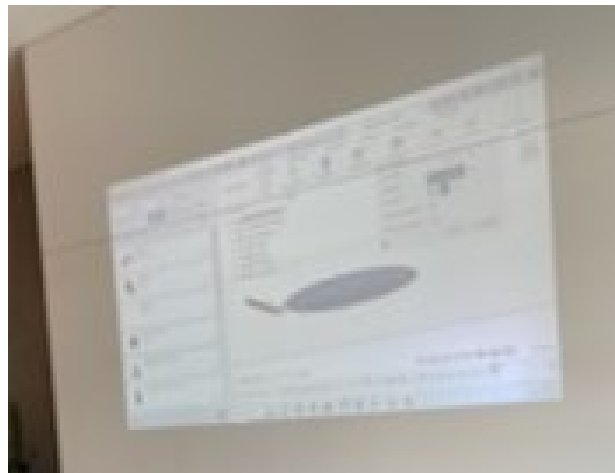
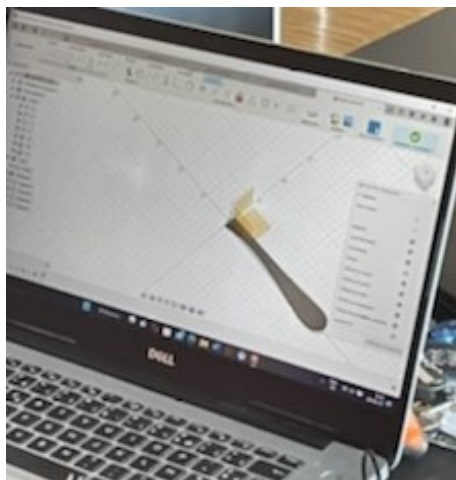
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[Go to index](#)

4) design of a customised fork handle

This technical aid provides a thickened handle that makes it easier for the patient to manipulate a fork. Magnets can be added to the 3D printed model so that the assistive technology can be removed independently by the patient.



3.4.3. Results and lessons learnt

The support of 3D designers and experts was largely necessary in the laboratory activities to effectively start designing technical aids from scratch according to the intended purpose and the specific anatomy of the future end-user. Without this support, trained healthcare providers would have tended to try to identify and 3D print a possibly existing model, attempting to adapt it to their patient's needs. While this may in part be a solution to some of the unresolved problems faced by people with disabilities (lack of technical aids on the market, cost of available products), it did not meet the objectives of multidisciplinary co-creation and total customization of technical aids that lie at the heart of the DEEP project. This level of empowerment

89



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[Go to index](#)

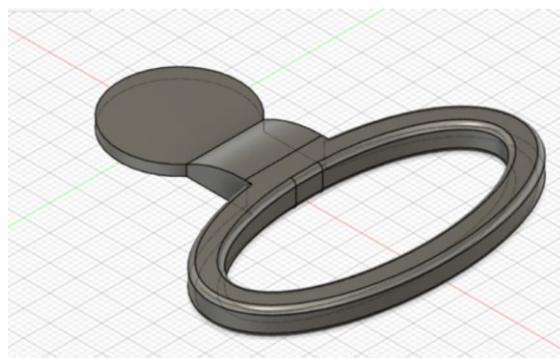
and expertise was successfully achieved after training and support in the use of 3D modelling software that was both available at a decent price and not extremely complex to use by people who were not experts in technical drawing and 3D simulation.

The use cases were chosen based on the actual needs but also taking into consideration the learning curves for the communities of practitioners. The lab activities thus offered the occasion to test different designs in practice with an increasing level of difficulty (from cubes, to cylinders, cones and curves).

Four technical aids could be successfully co-created and designed in the context of the laboratory activities in the project.

The trained people continued the activities and successfully produced further items in a fully autonomous way after being trained and supported in the context of the project. Here are a few examples of the aids thus produced:

- an aid to facilitate the entry and removal of a caddy token was produced for a patient who needed a wider grip possibility compared to the existing adapted tokens. That was related to the specific condition of the person who presented an amyotrophy of the intrinsic muscles of the hand. The customized design enables the patient to place the 4 long fingers in the oval of the ring more easily than with standard adapted tokens.



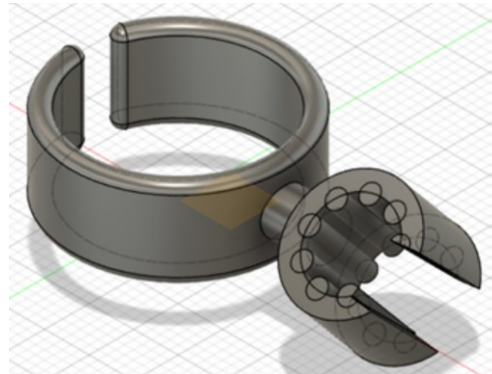
- a pencil guide finger ring consisting of two linked plastic rings. The pen guide is designed to help people with restricted movement in the hand. It is customized before being printed according to the finger used by each end-user.



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[Go to index](#)



The customized design enables the patient to place the 4 long fingers in the oval of the ring more easily than with standard adapted tokens

It is customized before being printed according to the finger used by each end-user.

In order to make the lab activities sustainable and enable their long-term continuation, perceived legal constraints and the issue of each co-creator's responsibility in the production and distribution of the technical aid have been identified as a problem.

Even the production and prescription of the aid by a caregiver or medical facility can be a challenge in some countries, as it is perceived to engage the responsibility of the co-creators and the prescribing organization in the event of a problem. As already mentioned, this has prevented some trained healthcare professionals from producing personalized aids in the delicate areas of mobility or critical care devices (e.g. adaptations to personal respiratory equipment), beyond 3D printing objects for basic daily use.

The problems experienced with the customised control of the wheelchair outline the necessity to very seriously perform the evaluation exercise provided in the training for the evaluation of ideas. Both the economic and legal dimensions must be considered as important criteria in the feasibility exercise.

It is recommended to assist the future stakeholders interested in the production and distribution of customised technical aids from that specific point of view, explaining e.g. the specific conditions under which the aids aren't required to be certified and do not fall under the legal definition of a medical device. In future versions of the DEEP training, it would be relevant to take those normative aspects into consideration to further guide and support the practitioners in the creation of aids that can actually and safely be provided to the end users. This is question of

91



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[Go to index](#)

organisational/regional sensitivity to risk and a potential topic for further harmonisation for an equal access to customised aids by the patients at European level. In fact, this is a complex subject where it would be interesting to harmonize policies and exchange best practices between institutions operating in different countries or in different contexts.

In Luxembourg, the DEEP partner organisation Lunex came up with the idea of 3D printing customised anatomical models that could be used for training future physiotherapists during their studies. Though out of the scope of the lab activities in the DEEP project, this idea could be a way to create awareness at a very early stage among future health professionals and engineering students about the customisation of care practices and the possibilities offered by the new technologies in the field of rehabilitation.

This idea of new laboratory activities is justified by the fact that the use of technology in the training of healthcare professionals has developed rapidly in recent years and that this process of integrating technology into education, broadly defined as technology-enhanced learning (TEL), has been stimulated by a number of factors, especially the pandemic, during which the implementation of IT solutions in teaching meant that the training of healthcare professionals was not interrupted despite the restrictions needed to combat Covid-19. However, most TELs recently developed focused on remote teaching and collaborative working, while the development of on-campus solutions, such as practical simulators and instrumented mannequins, has been less of a priority.

Mannequin simulators are used in healthcare professionals training to prepare some future graduates on procedures and specific profession-related tasks. Several solutions exist for the training on certain aspects in the field of medicine (e.g. vital parameters, emergency procedures...), using mannequins that range from simple (passive hardware) to more complex and sensor-based solutions. To date the offer in the field of physiotherapy training is however still very limited. One of the challenges that educators face is to reliably teach and transfer hands-on skills such as clinical diagnostic maneuvers, manual mobilization and manipulation of spinal segments. Several potential applications of 3D printing may be identified in this field.



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[Go to index](#)

4. DEEP implementation in Spain

4.1. Local training

4.1.1. Stakeholders involved

OCTOBER 2022 and January 2023: PREPARATION:

The preparation of the training courses by UAB has started with two online “round table” talks with representatives from associations and professional groups related to the objectives of DEEP. The result consisted in a list of difficulties that may be expected when training disabled people.



<https://www.facebook.com/proyectedeepbarcelona>.

The note says: “DEEP Barcelona organizes round tables with healthcare personnel, technicians and people with functional diversity. Meetings are held frequently and virtually via ZOOM.

In the first round table, on October 22, 2022, health personnel such as physiotherapists, occupational therapists and experts in 3-D printing came together to discuss the question: “What are the difficulties that I perceive when training people with disabilities in 3-D printing technology?”

Please see the following translation/transcript of the visualization results as featured in the screenshot above:

**Titles (moderator),
which make it easy to
summarize the results**

Answers



	given by the participants, ordered by the moderator according to similar content or to represent the same context		
Adaptation of content	The adaptation of content. It might be hard to know what level of difficulty to reach/whether people understand you or not.	Adaptability of content Adapt the content to each participant and each moment of their learning process to maintain motivation and the level of difficulty that encourages them to continue and help discover capabilities in the digital field.	
Factors regarding personal attitudes	More than barriers I would see the facilitators, we have already talked about adapting content, but the great advantage is the attitudinal factors, a new activity is created where I will be successful	First, I believe that the person should have a lot of critical capacity to consider their weaknesses, strengths and opportunities so that they are encouraged to create a product suitable for that person. For this reason, I believe that you will always need a counselor to help you detect this and shape your ideas.	
Focus on the person	Respect their expectations, not ours.	Find what motivates each user so that they are fully interested in learning.	
Lack of resources	Lack of resources or access to 3D printing platforms	Lack of knowledge in the subject	Lack of CAD knowledge
Participants have difficulties due to their functional diversity	Some present cognitive difficulty, that is, not everyone could understand it	Physically, it could also be difficult, but not impossible (this is our job), to handle the tools - computer, the printer itself -...	
Understand the objectives of the project	Purpose I think that the main shortcoming when facing any production system, when we face a design, is to properly understand the aims of the project and its scope.		

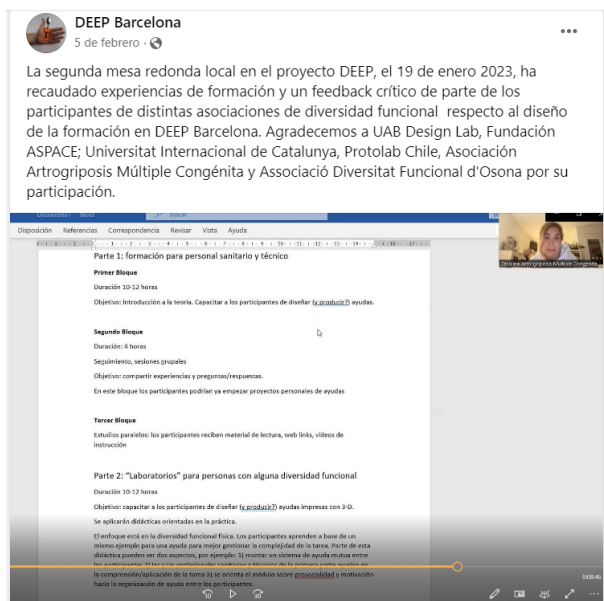
The second round table produced a feedback by associations and experts in the field regarding the design of the DEEP pilot training. The design was presented on this occasion by the trainers in DEEP Barcelona, Xavier Marimon, Anna Alcón and Marc Brundelius. Representatives from three associations strongly recommended to shorten the amount of hours of the pilot training to a minimum, and at least under 10 hours. Their feedback has led to a leaning of the schedule used in the Barcelona trainings and this approach has been confirmed by the availability of participants in the following trainings.



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[Go to index](#)



<https://www.facebook.com/proyectodeepbarcelona>.

The note says: "The second local round table in the DEEP project, on January 19, 2023, has collected training experiences and critical feedback from participants from different functional diversity associations regarding the design of training in DEEP Barcelona. We thank UAB Design Lab, ASPACE Foundation; Universitat Internacional de Catalunya, Protolab Chile, Asociación Arthrogriposis Múltiple Congénita and Associació Diversitat Funcional d'Osona for their participation."

On the other hand, first steps were taken to provide the accreditation of a DEEP training course as part of the professional internships of students of Universitat Autònoma de Barcelona. The proposal is currently promoted by Dr. Carrasumada Serrano and are being discussed within the UAB teaching staff in the career of speech therapy. The proposed way forward is to acknowledge and discount the hours of the DEEP training from the official time schedule of the internships, thus making the DEEP training an integral, though optional, part.

MARCH and APRIL 2023: First Round of trainings

The local trainings were split in five local trainings and one international training, and involved a total of 110 participants:



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[Go to index](#)

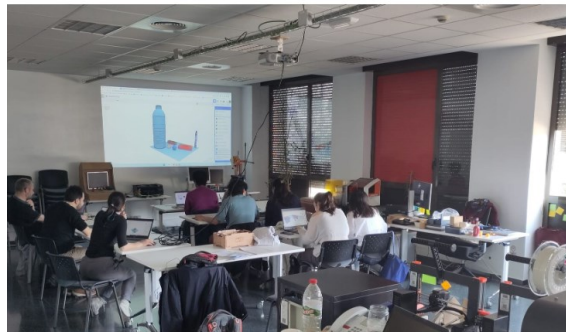
1. 22 and 23 of March, (3-D design and printing)



DEEP Barcelona

25 de marzo · 🌐

Día 2 de la formación DEEP (23 de Marzo): Anna y Xavier introducen en el programa de diseño Tinkercad (tinkercad.com).



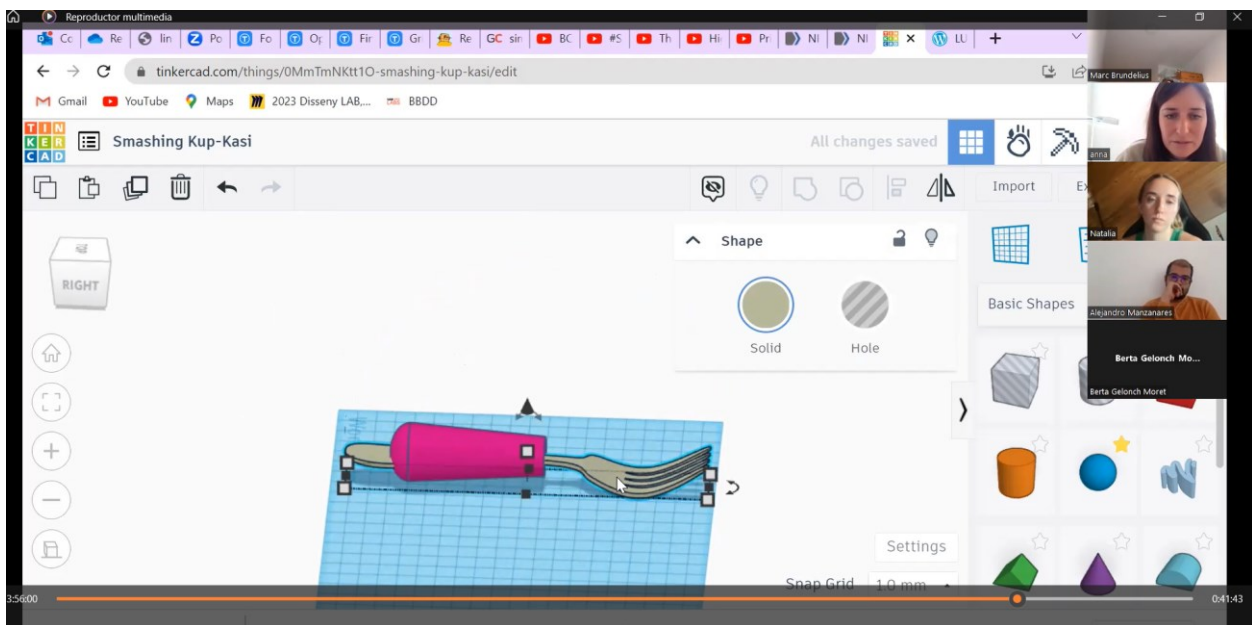
Ver estadísticas y anuncios

<https://www.facebook.com/proyectodeepbarcelona>

Promocionar publicación

The note says : Second day of the DEEP training (23 of March) : Anna and Xavier introduce to the design programme Tinkercad (tinkercad.com)

2. 20, 21 of April (3-D design and printing)



Screenshot of online training 20-21 APRIL, Anna Alcón explaining the function of Tinkercad.

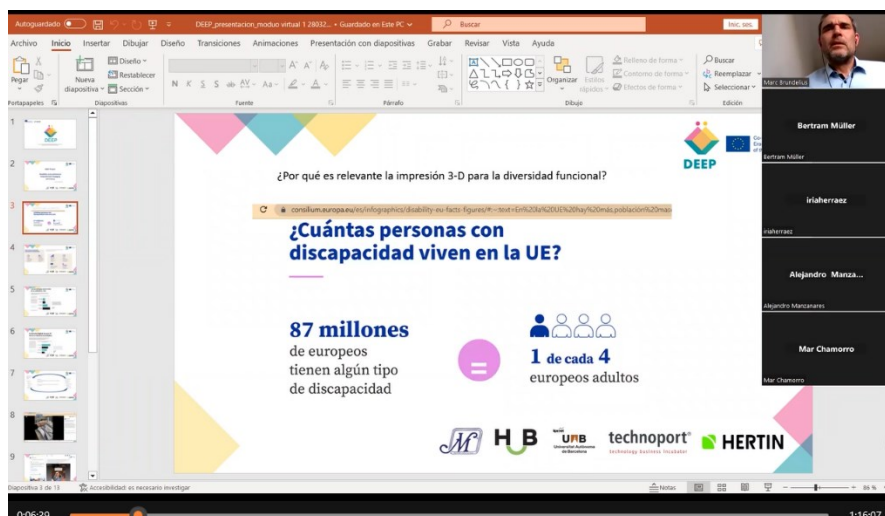


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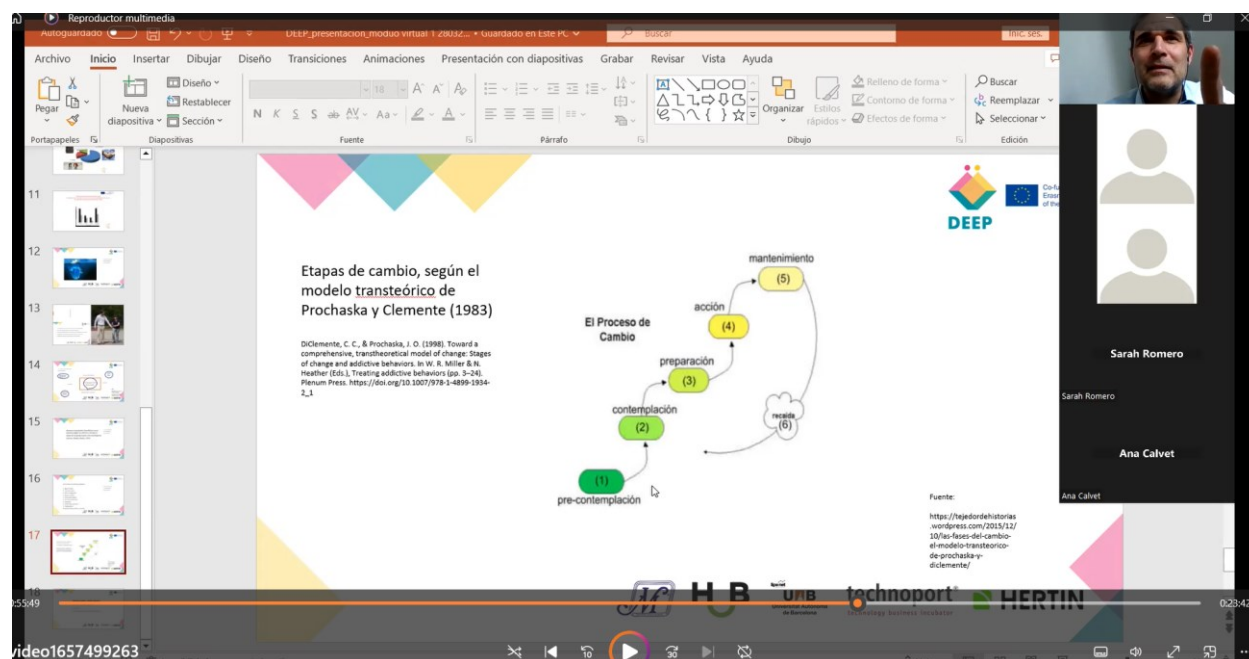
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[Go to index](#)



Screenshot of online training 20-21 APRIL. Marc Brundelius explaining the goal of inclusion in DEEP and the relevance of 3-D printing for people who live with disabilities.

Note: the first group and the second group of participants were trained together in the online classes on prosocial communication, motivation and relevance of 3-D printing for disabilities on the following dates:
28, march, 11, 18 and 25 of April.



Screenshot of online training 20-21 APRIL. Marc Brundelius explaining the Transtheoretical Model of Motivation and Stages of Change.

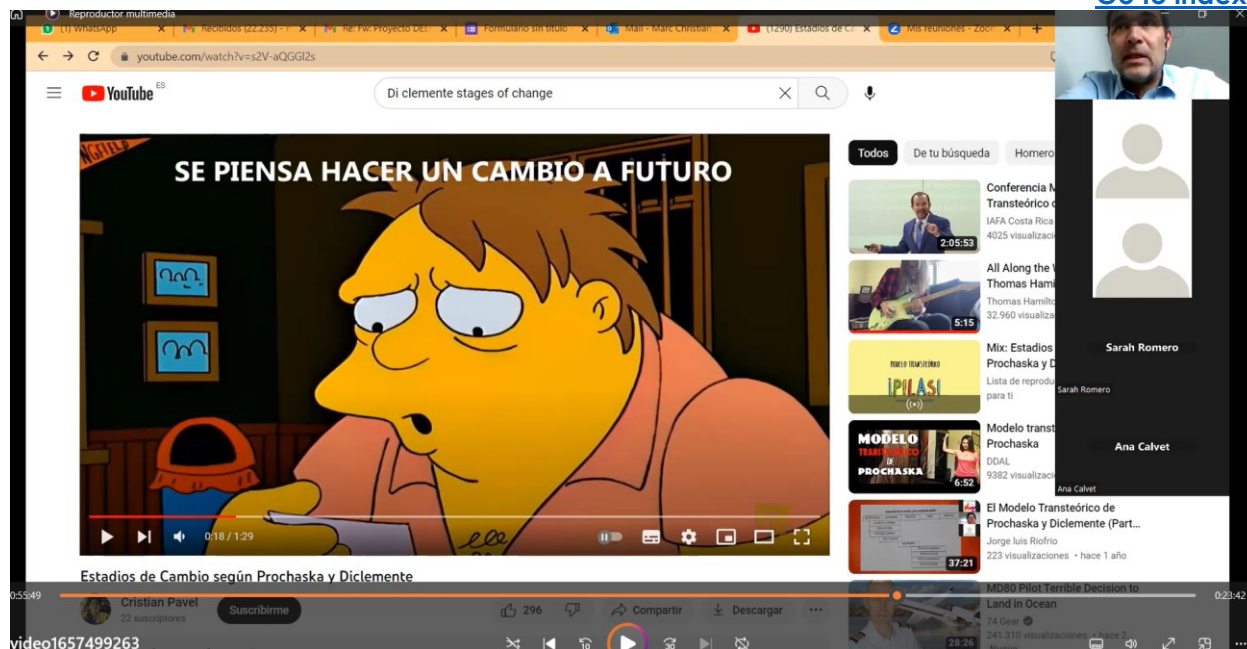


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[Go to index](#)



Screenshot of online training 20-21 APRIL. Marc Brundelius explaining the Transtheoretical Model of Motivation and Stages of Change, by showing a sequence of "The Simpsons" on alcoholism.

The total amount of hours for each group was 15 hours.

JUNE 2023: Second Round of Trainings:

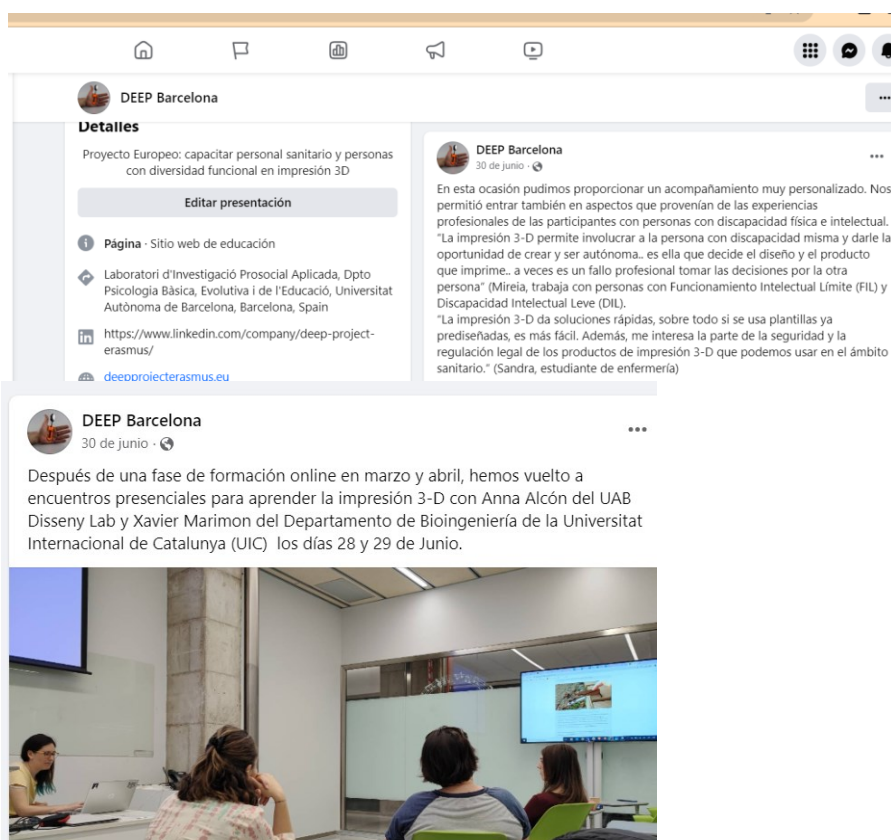
3. 28, 29, 30 June (blended mode, total of 15 hours)



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[Go to index](#)



<https://www.facebook.com/proyectedeepbarcelona>. The Note says:

ABOVE: After an online training phase in March and April, we have returned to face-to-face meetings to learn 3-D printing with Anna Alcón from the UAB Disseny Lab and Xavier Marimón from the Department of Bioengineering of the International University of Catalonia (UIC) on the 28th. and June 29.

BELOW: On this occasion we were able to provide very personalized support. It also allowed us to enter into aspects that came from the participants' professional experiences with people with physical and intellectual disabilities.

"3-D printing allows the person with a disability to be involved and give them the opportunity to create and be autonomous... it is they who decide the design and the product they print... sometimes it is a professional failure to make decisions for the other person" (Mireia, works with people with Borderline Intellectual Functioning (FIL) and Mild Intellectual Disability (DIL).

"3-D printing provides quick solutions, especially if you use pre-designed templates, it is easier. Additionally, I am interested in the safety and legal regulation of 3-D printing products that we can use in the healthcare field." (Sandra, nursing student)



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[Go to index](#)

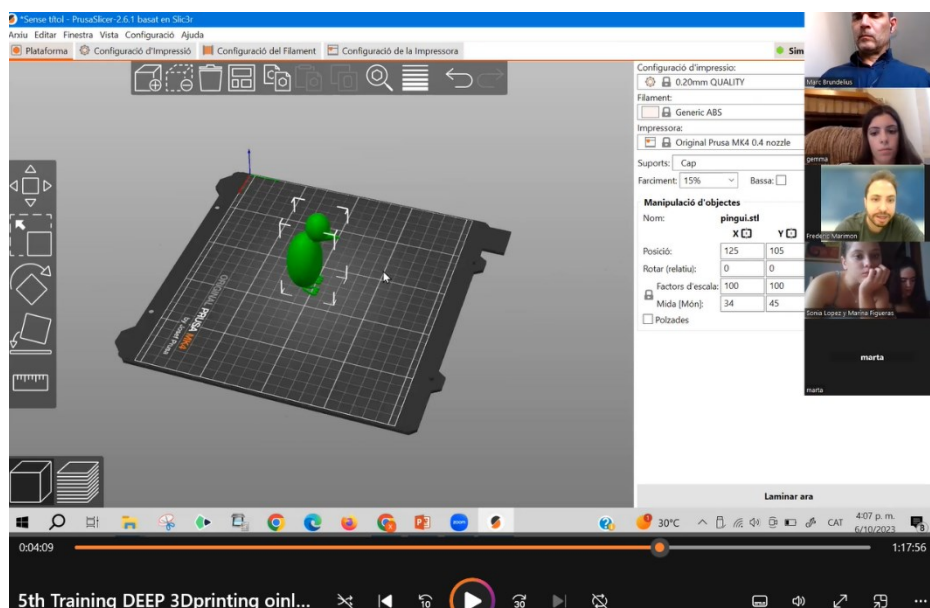
SEPTEMBER AND OCTOBER 2023: THIRD ROUND OF TRAININGS:

1. 15, 22 September and 13 Oct (in house training at ADIMIR Foundation, Montcada, Barcelona) total of 9 hours, planned, and reduced by management to 6.



<https://www.facebook.com/proyectedeepbarcelona>. The Note says: We had the opportunity to do training with therapists from the Center for Comprehensive Disability Care of the ADIMIR Foundation in Montcada, Barcelona (www.adimir.org). On September 15 and 22, as well as October 13, we will be with this group of occupational therapists, physiotherapists, psychologists and speech therapists, motivated to introduce 3-D printing in their work with girls, boys and adolescents. It is a very enriching experience!

2. 5 and 6 Octubre (online) with students of speech therapy of UAB, total 9 hours
- 3.



5 and 6 Octubre (online) with students of speech therapy of UAB

100



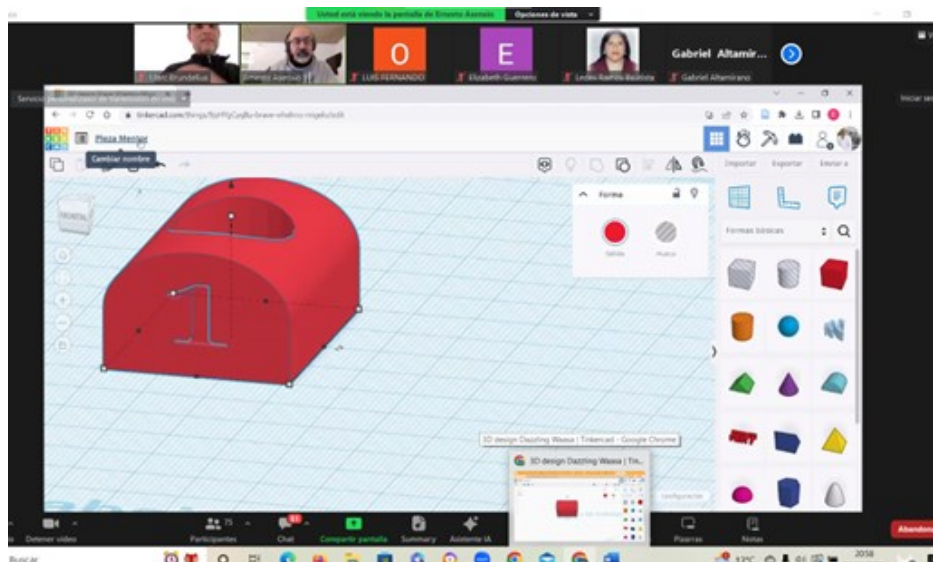
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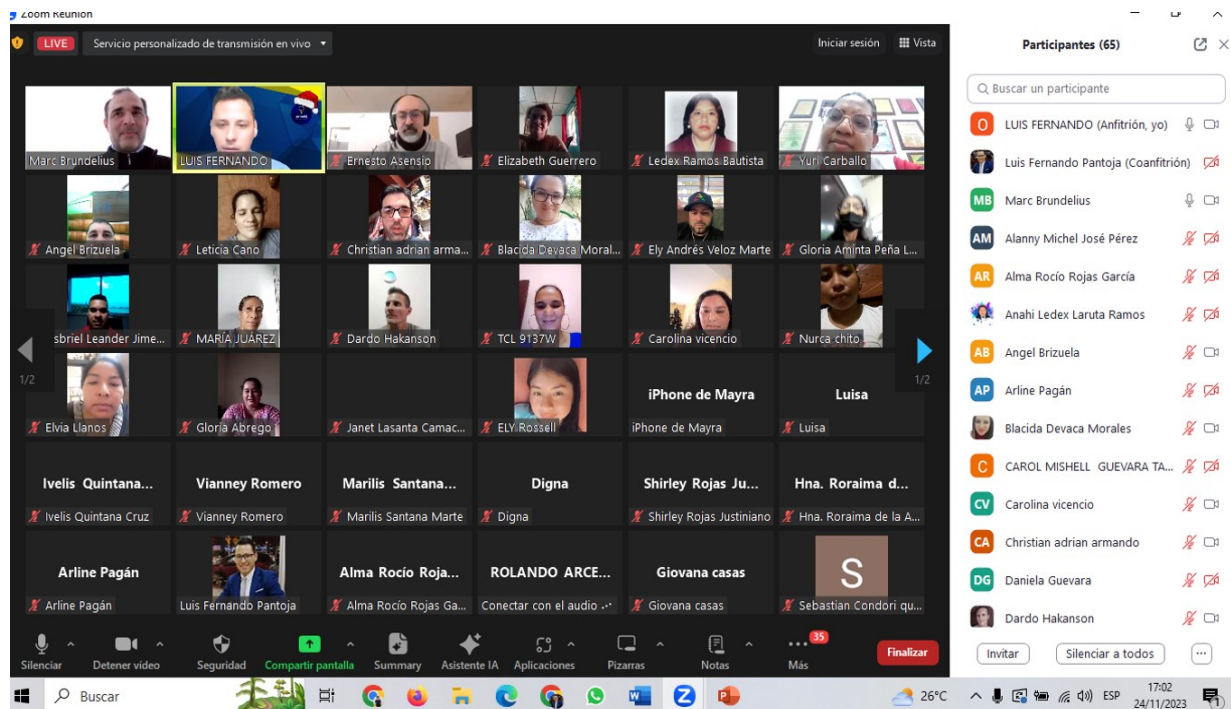
[Go to index](#)

NOVEMBER 2023: FOURTH ROUND OF TRAININGS

4. 23 and 24 November (online) with professional tutors of people who live with a disability, total of 5 hours.



DEEP training on 23 and 24 November (online) with Ernesto Asensio of UAB as trainer



DEEP training on 23 and 24 November (online)



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[Go to index](#)

4.1.1. Stakeholders involved

- Laboratory of Prosocial Applied Research at the Autonomous University of Barcelona/ Laboratori d'Investigació Prosocial Aplicada (Universitat Autònoma de Barcelona, UAB) (www.lipa-net.org)
- UAB Disseny Lab (UAB Design Lab) (<https://www.uab.cat/web/espais/disseny-lab-1345819749505.html>)
- Bioengineering Institute of Technology, Universitat Internacional de Catalunya (www.uic.es/en/bioengineering-institute-technology)
- Foundation Adimir (adimir.org)
- MENTOR NGO Santa Cruz, Bolivia (https://www.facebook.com/MentorONG/?locale=es_LA)

4.1.2. Content of the training

The content of the trainings has been oriented by the DEEP Handbook as agreed by the project partners and leaders. However, it was sometimes difficult to maintain the planned 15 hour format, and we insisted in attracting more people by offering more trainings, adapting the planning to their time schedule instead of insisting on our plans. With the exception of one inhouse training for an association, we could be quite sure that our participants attended voluntarily. In the course of the trainings, it became clear that for many professionals and also for students, 3-d printing was not something their employers would immediately require them to apply, so it was more of a personal interest in innovative approaches. The ratio between registered persons interested in the trainings and those of them eventually participating was on average between 5:1 and 10:1. In the case of the international training, there were 80 participants out of 500 registered.

The following translation is a typical 15 hour programme for the DEEP pilot training in Barcelona (the original planning is featured in the screenshot below this text):

PROGRAMME and contents of the DEEP Barcelona training program

Part I PRESENT

Using 3-D printing

22ND MARCH

Tuesday Classroom. Location: Universitat Internacional de Catalunya (UIC)
9 to 14:30h

23 MARCH

Thursday



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[Go to index](#)

Classroom. Universitat Autònoma de Barcelona, UAB Disseny Lab
9 to 14:30h

Contents:

Introduction to the maker world

- What is a maker space? What machines and people will I find in a maker space?
- What do the concepts "do it yourself" (DIY), "do it with others" (DIWO), "open source", "learn by doing" (learning by doing) mean?
- Online repositories
- What is the design thinking methodology? Research, ideation, prototyping and validation of projects.

Context of digital manufacturing

- Machines, tools and materials of a maker space (1).
- What is a 3D printer? What are its parts? What types are there?
- Why do I need a 3d printer? What are the benefits?
- What materials are used?
- Do I have to be an expert to use a 3D printer?

Introduction to the 3D design programs Tinkercad and On shape.

- 2D Design and 3D Design
- Exporting stl files
- File programs and formats

Projects related to functional diversity

Participatory debate, reflections and viability

- How is my environment and how can I apply technologies?
- Creation of communities

In addition, the open labs are open to anyone who wants to come and use the resources during the training or at the end of it.

Part II DISTANCE/Online

Prosocial communication between health professionals and users with functional diversity:

Dates and Contents

In the second part of the training we offer four online modules to train participants in building trusting interpersonal relationships. In addition, we talk about how to motivate themselves for the changes that both parties often have to accept in the care process and how they can make joint decisions between professionals and users or patients.



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[Go to index](#)

We follow the format of the round tables that started in October 2022, which are open to training participants and to health professionals and people with functional diversity.

28th MARCH

tuesday 19-20:00 h. at ZOOM.

The relevance of 3-D printing in the field of functional diversity.

Pro-sociality: How to communicate between health staff and users with functional diversity, the role of motivation and shared decision making.

April 11th

tuesday

19-20:00 hores for ZOOM

Prosocial quality communication and how we build trusting relationships in our environment.

April 18th

tuesday 19-20:00 hores for ZOOM

Motivation for change and making joint decisions

APRIL 25th

tuesday 19-20:00 hores per ZOOM Discussion: Applying prosocial communication to our relationships as professionals and users/patients: What and how to optimize it?



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[Go to index](#)



**UAB OPEN
LABS**



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PROGRAMA i continguts de la formació DEEP Barcelona

Part I *PRESENCIAL*

Utilitzar la impressió 3-D

22 MARÇ dimecres	Presencial. Lloc: Universitat Internacional de Catalunya (UIC) 9 a 14:30h
23 MARÇ dijous	Presencial. Universitat Autònoma de Barcelona, UAB Disseny Lab 9 a 14:30h

Continguts:

Introducció al món *maker*

- Que és un espai *maker*? Quines màquines i persones trobaré en un espai *maker*?
- Què volen dir els conceptes “fes-ho tu mateix”(DIY), “fes-ho amb els altres” (DIWO), “còdi obert” (open source), “apren fent” (learning by doing)?
- Repositoris online



- Repositoris online
- Que és la metodologia *design thinking*? Investigació, ideació, prototipatge i validació de projectes.

Context de la fabricació digital

- Màquines, Eines i materials d'un espai *maker* (1).
- Que és una impressora 3D? Quines són les seves parts? Quins tipus hi ha?
- Per què em serveix una impressora 3d? Quins beneficis aporta?
- Quins materials utilitzen?
- Haig de ser un expert per fer servir una impressora 3D?

Introducció als programes de disseny 3D Tinkercad i On shape.

- Disseny 2D i Disseny 3D
- Exportació d'arxius stl

- Programes i formats d'arxiu

Projectes relacionats amb la diversitat funcional

Debat participatiu, reflexions i viabilitat

- Com és el meu entorn i com puc aplicar les tecnologies?
- Creació de comunitats

A més, els open labs estan oberts per a qualsevol persona que vulgui venir a utilitzar els recursos durant la formació o en acabar-la.

Part II *A DISTÀNCIA/online*

Comunicació prosocial entre professionals sanitaris i usuaris amb diversitat funcional:

Dates i Continguts

En la segona part de la formació oferim quatre mòduls *online* per capacitar als participants en la construcció de relacions interpersonals de confiança. A més, parlem de com motivar-se per als canvis que ambdues parts sovint han d'acceptar en el procés de l'atenció i com poden prendre decisions conjuntes entre professionals i usuaris o pacients.

Seguim el format de les *taules rodones* que ja van començar en octubre 2022, i que estan oberts als participants de la formació i a professionals sanitaris i persones amb alguna diversitat funcional.

28 de MARÇ
dimarts

19-20:00 hores per ZOOM.

La rellevància de la impressió 3-D per a l'àmbit de la diversitat funcional.

La prosocialitat: Com comunicar entre personal sanitari i usuaris amb diversitat funcional, el rol de la motivació i la presa de decisions compartides.



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[Go to index](#)

11 d'Abril dimarts	19-20:00 hores per ZOOM La comunicació de qualitat prosocial i com construïm relacions de confiança en el nostre entorn
18 d'Abril dimarts	19-20:00 hores per ZOOM La motivació pel canvi i la presa de decisions conjunts
25 d'ABRIL dimarts	19-20:00 hores per ZOOM Discussió: Aplicar la comunicació prosocial a les nostres relacions com professionals i usuaris/pacients: Què i com optimitzar-la?



As translated above in 4.1.2, this is the example of a typical syllabus of the Spanish DEEP trainings

4.1.3. Evaluation and feedback

Across five out of six training groups, 18 participants has given feedback by filling out the questionnaires on the pilot training contents. All questionnaires were being used as post-test, when finishing the training. All answers regarding the training on prosocial behaviors were correct (n=18), answers regarding 3-D printing and the motivational model were mostly correct, too.

THEMATIC AREA: MOTIVATIONAL MODEL

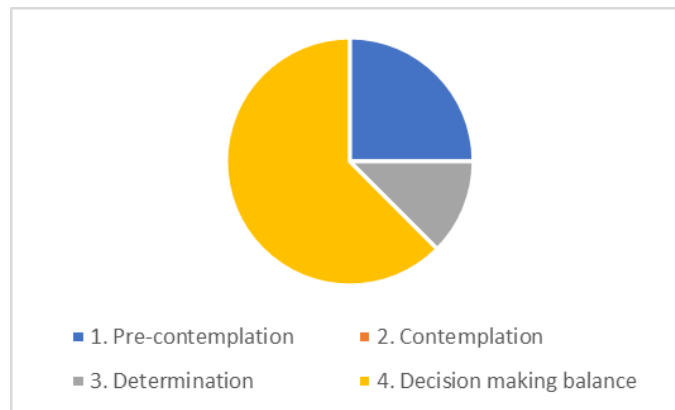


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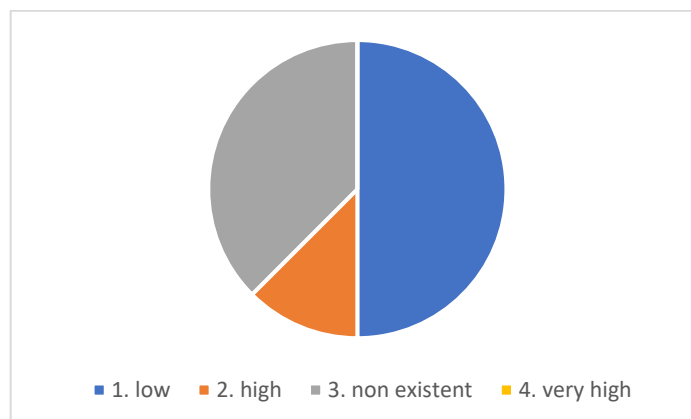


[Go to index](#)

ITEM 4: *In the Trans-theoretical Model, which of these stages is not part of the stages of change. (n=8)*



ITEM 5: *In the pre-contemplation stage, the decision-making balance is (n=8)*



ITEM 6: *In the Trans-theoretical Model what are the factors affecting change (n=8)*





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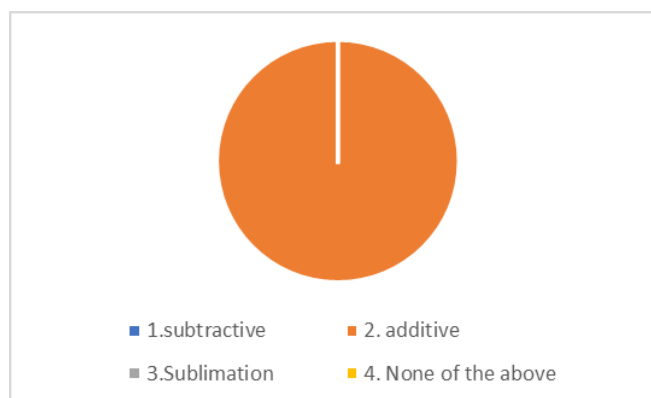


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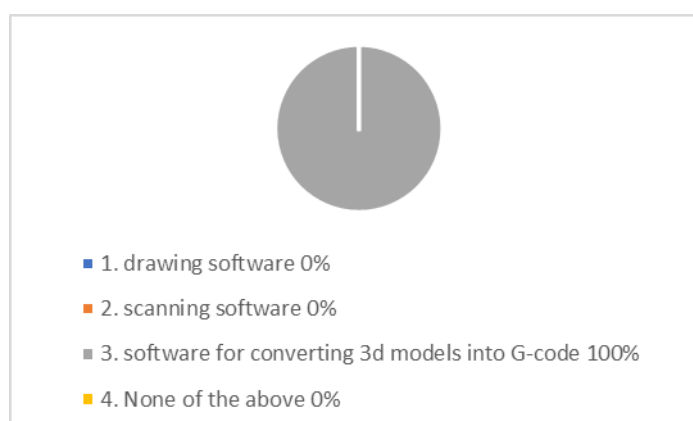
[Go to index](#)

Thematic area: 3-D printing

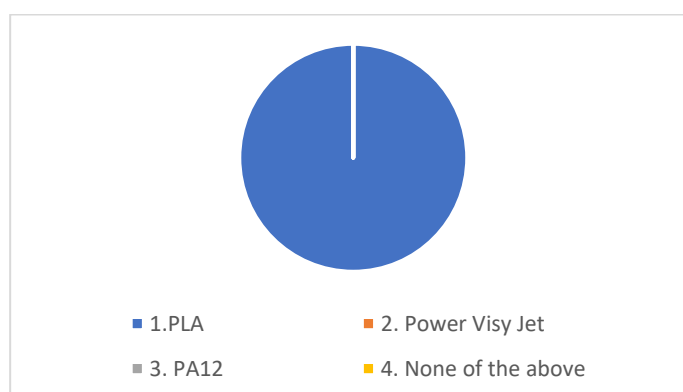
ITEM 7 *3D printing is a manufacturing technology (n=8)*



ITEM 8: *What is slicing software? (n=8)*



ITEM 9: *Which of these materials is used in FDM 3D printing? (n=8)*





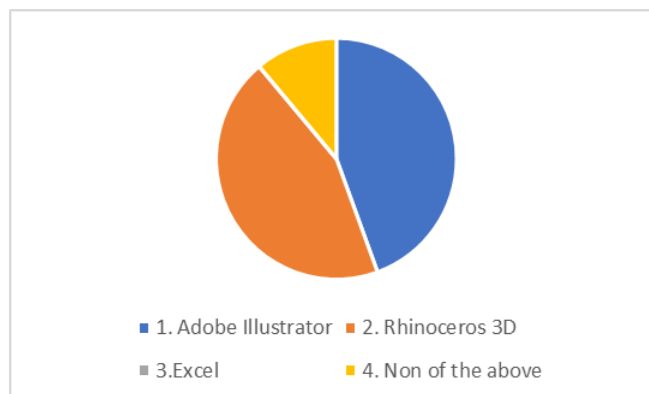
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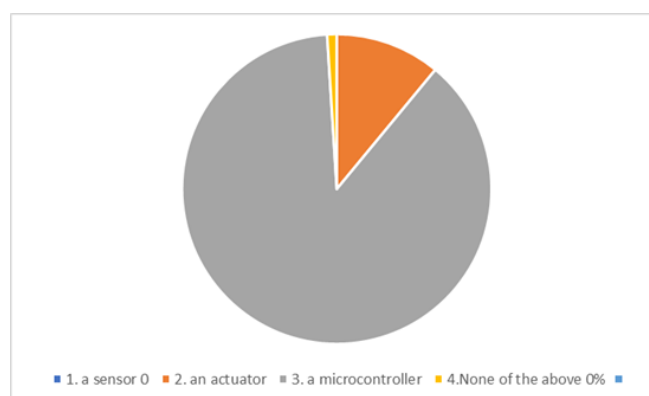
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PUBLIC POLICY INNOVATION

[Go to index](#)

ITEM 10: Which of these software packages should be used for the preparation of vector graphics? (n=8)

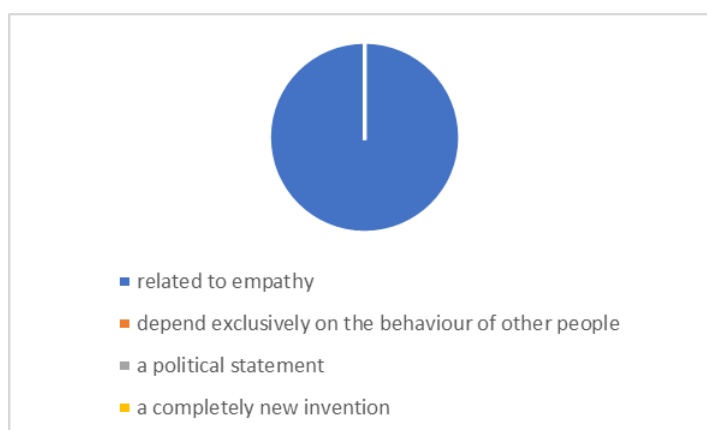


ITEM 11: Arduino is (n=8)



Thematic area: Prosocial behaviours

ITEM 12: Prosocial behaviours are (n=18)



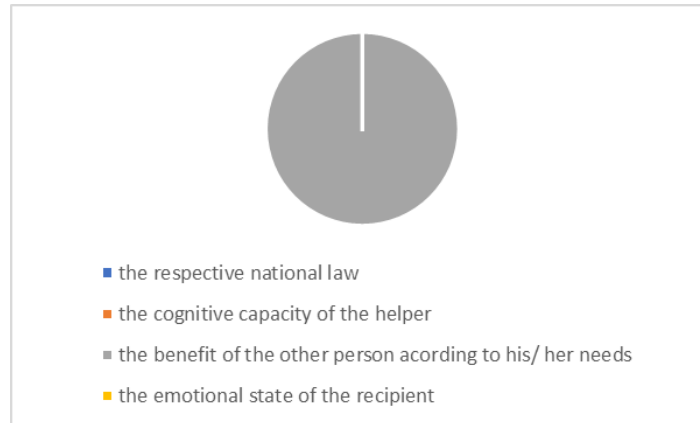


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[Go to index](#)

ITEM 13: *The definition of prosocial behaviour is based on* (n=18)



ITEM 14: *What are the important criteria for effective prosocial actions?* (n=18)



ITEM 15: *When I actively listen to the interlocutor* (n=18)





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[Go to index](#)

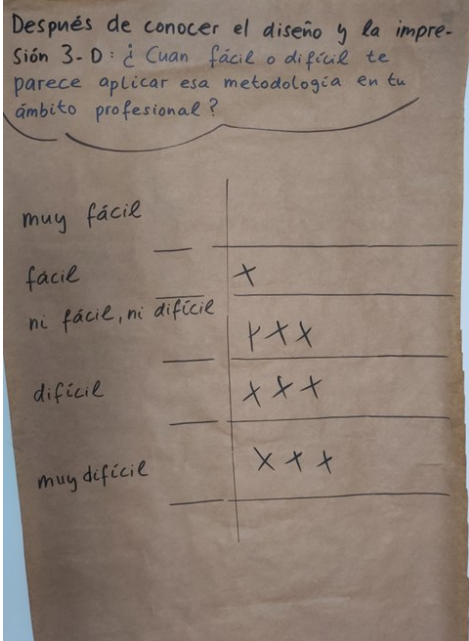
4.1.4. Recommendations and lessons learnt

As mentioned above, the participants of the trainings have been coming from very different organizations and university courses. The trainings therefor were not the same in terms of time and selection of contents. First priority was always given to the topic of 3-D design and printing, and less time was spent on the stages of change model or prosocial communication. A brief module was provided on disability and the relevance of 3-D printing, however the acquired knowledge was not broad enough to be tested using the items of the questionnaire afterwards.

A possible recommendation is to identify interested organisations that want to train their workforce of health personnel and who can invite patients to the training. This has been intended by the “round table talks” staring as early as October 2022. It may though imply that participants are being sent to the training by their superiors, so voluntary assistance is not a criterium. Instead, promoting the training on the “free” market has led to a chain of small groups of participants, with less time available than planned in the project.

4.2 Follow-up meetings

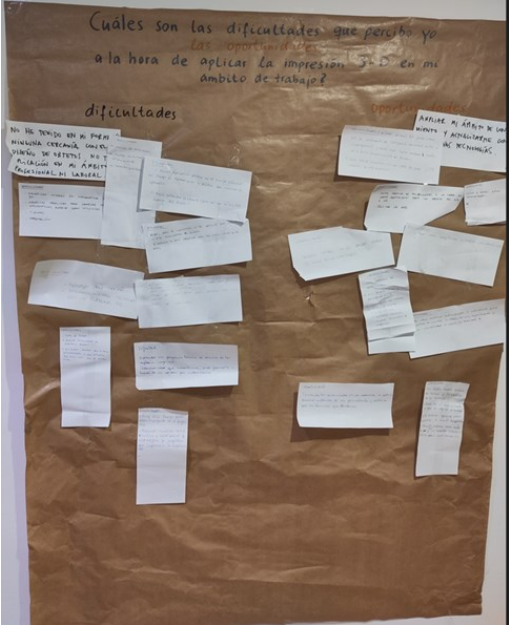
4.2.1. Context and methodology



Después de conocer el diseño y la impresión 3-D: ¿Cuan fácil o difícil te parece aplicar esa metodología en tu ámbito profesional?

muy fácil	
fácil	+
ni fácil, ni difícil	+++
difícil	+++
muy difícil	+++

After knowing 3-D design and printing: How easy or difficult does it seem to you to apply this methodology in your professional area?
Very easy: 0votes



Cuales son las dificultades que percibo yo a la hora de aplicar la impresión 3-D en mi ambito de trabajo?

Two results of the visualization methodology as a result of the pilot training in the ADIMIR Foundation, 13 OCT 2023



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[Go to index](#)

Easy: 1vote Neither easy nor difficult: 3votes Difficult: 3votes Very difficult: 3votes	
--	--

The experience of follow-up meetings in DEEP was concentrated on the training at the ADIMIR Foundation, a single organization and a stable group over the respective training period (participation being voluntarily or mandatory, we could not influence), and where we were able to obtain feedback both quantitative and qualitative. However, at the Foundation ADIMIR the management asked for a reduced amount of hours for the training (9hours, later 6 hours). In the follow up session, on 13th of October the group expressed a high perception of difficulties on the one hand. The participants, on the other hand, acknowledged the value of 3-D printing for the users- people with disabilities.

In the following, please find the English translation and transcription of the results of the visualization (as in pictures above)

RESULTADOS DE LA FORMACIÓN EN EL PROYECTO DEEP (UAB)

Encuesta con tarjetas hecha a 10 representantes de personal sanitario de la Fundación ADIMIR, 13 Octubre 2023 (físio terapeutas, psicólogas, terapeutas ocupacional, logopedas)

Cada célula de la tabla abajo representa una tarjeta con la opinión o experiencia de una persona.

Respondieron a la siguiente pregunta: ¿Cuáles son las dificultades y oportunidades que percibo yo a la hora de aplicar la impresión 3-D en mi ámbito de trabajo?

RESULTS OF TRAINING IN THE DEEP PROJECT (UAB)

Card survey made to 10 representatives of health personnel of the ADIMIR Foundation, October 13, 2023 (physiotherapists, psychologists, occupational therapists, speech therapists).

Each cell in the table below represents a card with one person's opinion or experience.

They answered the following question: What difficulties and opportunities do I perceive when applying 3-D printing in my field of work?

Dificultades Difficulties	Oportunidades Opportunities
------------------------------	--------------------------------

113



<p>Escasa aplicación práctica en el campo laboral por tiempo de aprendizaje y práctica que requiere su aplicación Difícil entender el software (para mí que no soy del ámbito del diseño)</p> <p>Scarce practical application in the work field due to the learning time and practice required for its application. Difficult to understand the software (for me as a non-designer)</p>	<p>Ampliar mi ámbito de conocimiento y actualizarme con las nuevas tecnologías.</p> <p>Broaden my scope of knowledge and update myself with new technologies.</p>
<p>Tiempo de aplicación Muchas herramientas para un solo producto Necesita práctica</p> <p>Application time Many tools for one product Needs practice</p>	<p>Crear diseños 3-D para crear set de evaluación de integración sensorial táctil (estereognosia) y táctil oral (para evaluar dentro de la boca reconocimiento de formas).</p> <p>Crear red de colaboración con UAB 3-D para creación de este material.</p> <p>Create 3-D designs to create tactile sensory integration (stereognosia) and oral tactile (to assess inside the mouth shape recognition) evaluation set.</p> <p>Create collaborative network with UAB 3-D to create this material.</p>
<p>No he tenido en mi formación ninguna cercanía con el diseño de objetos No tiene aplicación en mi ámbito profesional ni laboral</p> <p>I have not had in my training any proximity to the design of objects. It has no application in my professional or work environment</p>	<p>Mayor abanico de posibilidades a la hora de crear adaptaciones para los objetos del día a día Facilitar las AVD's (actividades de la vida diaria)</p> <p>Greater range of possibilities when creating adaptations for everyday objects Facilitating ADL's (activities of daily living)</p>
<p>Necesitas interés en informática e impresión 3-D Necesitas habilidad para manejar programas informáticos, aunque sean intuitivas Tiempo Imaginación</p>	<p>Acceso a diseñar piezas personalizadas</p> <p>Access to design custom parts</p>



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[Go to index](#)

<p>Need interest in computer science and 3-D printing You need the ability to handle computer programs, even if they are intuitive. Time Imagination</p>	
<p>Tiempo, falta de conocimiento en la aplicación para crear No tener conocimiento de diseño EL material no está adaptado para los niños (meter en la boca)</p> <p>Time, lack of knowledge in application to create No knowledge of design Material is not adapted for children (put in mouth)</p>	<p>Poder crear adaptaciones a medida, individualizadas</p> <p>Be able to create custom, individualized adaptations</p>
<p>Aprender a diseñar, necesitaría una formación más extensa y practicar Falta de tiempo tanto para diseñar como para imprimir Falta de creatividad</p> <p>Learning to design, would need more extensive training and practice Lack of time for both designing and printing Lack of creativity</p>	<p>Poder hacer algo desde cero y muy personalizado</p> <p>Being able to make something from scratch and very personalized</p>
<p>Tiempo para crear Desconocimiento técnico con la máquina 3-D</p> <p>Time to create Lack of technical knowledge with the 3-D machine</p>	<p>Gran variedad de aplicaciones Muy personalizable y detallista al usuario Crear aquello que todavía no existe y que se necesita: grafomotricidad, regulación emocional, diferentes herramientas de adaptación</p> <p>Wide variety of applications Highly customizable and user-detailed Create what does not yet exist and what is needed: graphomotor skills, emotional regulation, different adaptation tools.</p>
<p>Falta de tiempo Requiere conocimientos en tecnología previos</p>	<p>Poder crear material especializado e individual para una persona en concreto-> adaptación muy</p>



<p>Los diseños tendrían que ser muy personalizados, lo que dificulta que más niños usen la misma pieza</p> <p>Lack of time Requires previous knowledge of technology Designs would have to be very personalized, which makes it difficult for more children to use the same item</p>	<p>especializada y única -> posibilidad de mejora en el paciente</p> <p>Be able to create specialized and individualized material for a specific person-> very specialized and unique fitting -> possibility of patient improvement</p>
<p>Aprender un programa técnico de diseño de los objetos a imprimir Podemos saber que necesitamos, pero plasmarlo a través de un software para materializarlo</p> <p>Learn a technical program to design the objects to be printed. We can know what we need, but translate it through software to materialize it.</p>	<p>Teniendo los conocimientos previos necesarios, se podría diseñar materiales de uso personalizado y exclusivo para los alumnos que atendemos</p> <p>Having the necessary prior knowledge, we could design materials for personalized and exclusive use for the students we serve.</p>
<p>Hay poco tiempo para poder afianzarte en el programa Requiere cambiar ciertos hábitos a nivel laboral y naturalizar la logística que implicaría la impresión 3-D</p> <p>There is little time to become familiar with the program. It requires changing certain work habits and naturalizing the logistics involved in 3-D printing.</p>	<p>Los objetos creados podrán ser hechos a la medida de los usuarios Puede ser un espacio creativo para el equipo de trabajo Se podrían generar nuevos avances a nivel terapéutico Permite explorar otras facetas y tener una mirada interdisciplinar para nivel terapéutico.</p> <p>The objects created can be custom-made for the users. It can be a creative space for the work team. New therapeutic advances could be generated It allows to explore other facets and to have an interdisciplinary look at the therapeutic level.</p>

4.2.2. Discussions and feedback gathered

New ideas of how to integrate the technology into the therapies came from the speech therapists in the group. They suggested to invite those students of speech therapy of the UAB that had previously participated in the DEEP trainings. These students could then help the staff of Foundation ADIMIR to design and print devices

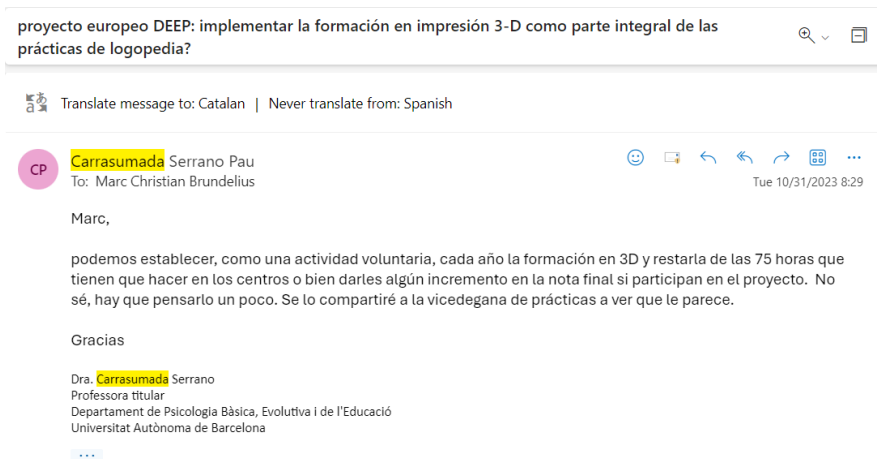


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[Go to index](#)

and objects which are a help in everyday life of the people with disabilities. Also, they proposed to offer considerably more training hours to the students than accepted in the Foundation. Currently, the coordinator of DEEP in Barcelona, Marc Brundelius, is communicating with the responsible academic in charge, Dra. Carasumada Serano, on a rule to integrate the DEE pilot training into the mandatory professional internships of speech therapy student.



4.2.3. Results and lessons learnt

The results among participants have shown an elevated awareness and motivation to apply the design and 3-D printing of objects for everyday use by people with disabilities.

Proyecto DEEP - Certificado





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Proyecto DEEP - Certificado

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Translate message to: Catalan | Never translate from: Spanish



eva gonzalez estevez <eva2001gonzalez@hotmail.es>
To: Marc Christian Brundelius

😊 📧 ⏪ ⏩ 📅 ...
Sat 12/2/2023 19:53

Hola Marc,

Mi DNI es 4 [REDACTED]

Como estudiante de psicología no he tenido la oportunidad de aplicar el diseño y la impresión 3-D con personas con alguna discapacidad, pero es un ámbito que encuentro interesante y que en algún momento me gustaría aplicar.

¡Muchas gracias por el curso, aprendí mucho!

Saludos,
Eva

Proyecto DEEP: CERTIFICADO Modelo



Translate message to: Catalan | Never translate from: Spanish



Mireia Hernández Aguilera <mhernandez@acidh.org>
To: Marc Christian Brundelius

😊 📧 ⏪ ⏩

Buenos días Marc,

la verdad es que lo sigo intentando con una de las personas que atiendo.

Hay una resistencia muy grande por parte de él hacia los profesionales que le acompañan.

Muchas gracias. Un saludo,



Mireia Hernández
Referent de Suport
Fundació Privada Tutelar Acidh
mhernandez@acidh.org
T.93.219.36.51/ 670.90.52.44

In terms of lessons learned, there is currently a growing interest in 3-D printing offered to people with disabilities and also the relevant health professions. A number of big hospitals and vocational training academies run their own programs on 3-D design and printing. However, it is still a subject that is often perceived as not naturally

118





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[Go to index](#)

related to health professions, such as psychology, speech therapy, physio or occupation therapy.

As a consequence, participants and their employers are only prepared to invest a very limited amount of time. Many recognize that more time may have enabled them to make 3-D printing a part of their job. Others rather come to the conclusion that 3-D printing should be offered by professionals from the technical or otherwise specialized professions (see: ADIMIR feedback and follow-up session).

There have been associations that would not participate in the pilot trainings since they did not think disabled people could be interested in the program (they did not ask them, though) and others on the contrary would have participated with a couple of dozens of participants- but we met only at the very end of DEEP (www.asproseat.org).

4.3. Supervision meetings

Activities in Spain focused on training, with a much higher number of people trained over a longer period than in the other regions. As a result, supervision meetings could not be finalised at this stage and will continue into 2024, using the “Round table talks” as a platform. The Round table has been initiated with this intention in mind and will therefore serve the purpose of the DEEP project into 2024.

4.4. Laboratory activities

Laboratory activities have been planned from October 2023 on, as a result of the follow-up session at Adimir foundation (see chapter 4.2.2). As Universitat Autònoma de Barcelona prepares the integration of the DEEP pilot training with the mandatory internships of students of speech therapy, those activities will continue into 2024.



Annex: Evaluation questionnaire used for the local trainings

In the evaluation addressed to professionals who participated in the trainings (health professionals and makers), DEEP model experts designed an ad hoc questionnaire to measure learning outcomes to examine both areas of technical competence (hard skills) and interpersonal skills (soft skills).

The questionnaire created (Part III, Annex I of DEEP's Handbook) allows to assess the following aspects:

- Increase in knowledge on the topic of disability, in particular on the issues regarding motor, hearing, visual, and cognitive disabilities and relevant European legislative frameworks;
- Increase in knowledge and abilities regard to prosocial and motivational approaches;
- Increase in knowledge and skills in the field of 3D prototyping;
- Increase in knowledge of the world of assistive devices and auxiliaries developed through technology.

During the partner meeting organized in Ostrava (second transnational meeting), partners agreed however, with reference to this questionnaire and the light of the feedback reported by the participants on the number of questions considered excessive, to reduce the questionnaire from 38 to 15 items, respecting the representativeness of the content of the questions in relation to the training modules. In the local training, trainers administered this reduced version of the questionnaire:

1. What is the main International Classification system on disability?
 - a) ICDH
 - b) ICF-CY
 - c) ICF
 - d) VADO
2. How are disabilities categorized?
 - a) Physical, mental, intellectual and sensory.
 - b) Sensory, motor, intellectual and mental.
 - c) Physical, intellectual and sensory
 - d) Motor, intellectual and sensory



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[Go to index](#)

3. Identify the correct statement:
- a) Sensory disabilities affect only sight and hearing.
 - b) Sensory disabilities affect only sight hearing and smell
 - c) Sensory disabilities affect the senses sight, hearing but also touch, taste and smell
 - d) Sensory disabilities affect the senses touch, taste and smell but also sight
4. In the Trans-theoretical Model which of these stages does not fall within the stages of change:
- a) Pre-contemplation
 - b) Contemplation
 - c) Determination
 - d) Decision-making balance
5. In the precontemplation stage, the decision balance is:
- a) Low
 - b) High
 - c) Non-existent
 - d) Very high
6. In the Trans-theoretical Model, what are the factors that play a role in the change:
- a) Self-efficacy and decision-making balance
 - b) Self-control
 - c) Sense of helplessness
 - d) Mindfulness
7. 3d Printing is a production technology:
- a) Subtractive
 - b) Additive
 - c) Sublimation
 - d) neither of the above
8. What is slicing software ?
- a) a drawing software
 - b) a scanning software
 - c) a software for converting 3d models to G-code
 - d) neither of the above
9. Which of these materials is used in 3d FDM printing?
- a) a drawing software
 - b) a scanning software
 - c) a software for converting 3d models to G-code



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[Go to index](#)

d) neither of the above

10. Which among these software is necessary to use for the preparation of vector graphics?

- a) adobe Illustrator
- b) Cura
- c) Excel
- d) neither of the above

11. Arduino is:

- a) a sensor
- b) an actuator
- c) a microcontroller
- d) neither of the above

12. Prosocial behaviours are:

- a) linked to empathy
- b) depend exclusively on the behaviours of the other people
- c) a political statement
- d) a completely new invention

13. The definition of prosocial behaviours is based on:

- a) the respective national law
- b) the cognitive capacity of the author of the help
- c) benefitting the other person according to his/her needs
- d) the emotional state of the receiver

14. Which are important criteria for effective prosocial actions? Prosocial behaviours:

- a) increase trust and the probability of reciprocity and the receiver gains autonomy
- b) make the receiver of the help more dependent on the author
- c) increase mutual sympathy
- d) causes emotions of inferiority in the receiver

15. When listening actively to the other person:

- a) I ask from time to time if I have understood correctly what he/she wants to express
- b) I already think about what I want to respond
- c) I take care of other thinks at the same time
- d) I interrupt when the other one talks for too long



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[Go to index](#)

In order to do a quantitative analysis of the responses provided by participants, partners in addition agreed to choose, for each country partner, a sample of 15 professionals who participated in the pilot training from the total number of 40 health professionals and makers professionals involved (direct multi actor targets).

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