



Knowledge & Technology Transfer of Emerging Materials &
Technologies through a Design-Driven Approach

Deliverable 3.2: Pre-mobility

Author: **CHEMARTS @ Aalto University - Aalto**

@datematseu #datematseu
www.datemats.eu



Co-funded by the
Erasmus+ Programme
of the European Union



Datemats

Knowledge & Technology Transfer of Emerging Materials & Technologies through a Design-Driven Approach
www.datemats.eu

@datematseu

#datematseu

| | |
|-------------------------------|-----------------------------------------------------------|
| Deliverable | 3.2 |
| Deliverable title | Pre-mobility |
| Work package | WP3 |
| WP Leader | Politecnico di Milano |
| Date of submission | 2020-07-15 |
| Number of pages | 27 pages |
| D. lead beneficiary | Aalto University |
| Partners involved | Polimi, Tecnun, Kea, Aalto, Materially |
| Type | Electronic version published on-line |
| Type specification, if needed | Learning activity, online even, videos, multimedia |
| Dissemination level | PU = Public |

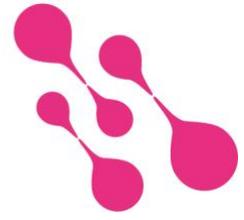
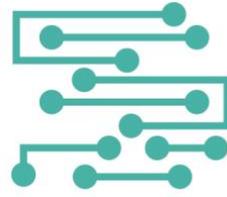
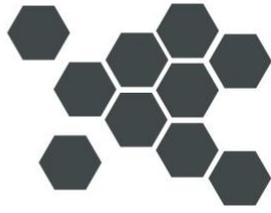
Knowledge & Technology Transfer of Emerging Materials & Technologies through a Design-Driven Approach
Agreement Number: 600777-EPP-1-2018-1-IT-EPPKA2-KA.
Start Date: 2019-01-01



Datemats project has been Co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein

EXECUTIVE SUMMARY

The following document summarizes the DATEMATS 3.2 Pre-mobility activity lead by Aalto University. In the development of the activity four partners participated: KEA, Polimi, Tecnun and Materiality. The report is divided in 5 chapters: 1) The description of the pre-mobility activity; 2) The materials and teaching methods that each of the four schools developed for the activity; 3) The call - reached and registered students; 4) Results & conclusion; and 5) Annexes.



INDEX

| | |
|---------------------------------------------------------------------------|------------------|
| <u>EXECUTIVE SUMMARY</u> | <u>4</u> |
| <u>1 DESCRIPTION OF THE PRE-MOBILITY ACTIVITY</u> | <u>5</u> |
| <u>2 MATERIALS FOR THE PRE-MOBILITY ACTIVITY BY PARTNER</u> | <u>6</u> |
| 2.1 EXPERIMENTAL WOOD-BASED MATERIALS EM&T BY AALTO UNIVERSITY | 7 |
| 2.2 ADVANCED GROWING EM&T BY KEA | 8 |
| 2.3 INTERACTIVE CONNECTED SMART (ICS) EM&T BY POLIMI | 8 |
| 2.4 NANOMATERIALS EM&T BY TECNUN | 9 |
| <u>3 THE CALL - REACHED AND REGISTERED STUDENTS</u> | <u>10</u> |
| <u>4 RESULTS & CONCLUSION</u> | <u>13</u> |
| <u>5 ANNEXES</u> | <u>26</u> |

1 DESCRIPTION OF THE PRE-MOBILITY ACTIVITY

The DATEMATS pre-mobility activity consists of three parts: 1) introduction & inspiration, 2) online Q&A session (optional), 3) students feedback. The approach is blended, including learning sessions, videos and online discussion. The goal of pre-mobility is mainly to be the understanding module of the proposed D 3.1 syllabus (to be fully tested in the D 5.2 mobility activity in the spring 2021), aiming to introduce the scope of EM&T, and to inspire students to further explore the new materials and technologies of the four HEIs.

1.1. Partners' Objectives:

- to select 120 students to join the DATEMATS pre-mobility activity. At least 30 students by EM&T area.
- to submit the working materials: videos/readings/questionnaire(s)/other materials.
- to organise a virtual session to discuss the materials and/or make questions to invited experts (optional).
- to collect feedback from students related to the pre-mobility activity.

1.2. Students' Objectives:

- to identify key concepts of each EM&T.
- to familiarise with and to get inspired by each EM&Ts materials & technologies.
- to envision how advanced EM&Ts materials and technologies could make life easier and more comfortable in the future.

1.3. Example of the structure

The following example structure is used as a guideline structure for the four partners involved in the development of the teaching materials. It is divided in the 3 parts explained above. The expected workload by EM&T activity is between 30 min to 3 hour (maximum).

| When | What | Who | Where |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------|---------------------------------------------------------|
| Part 1: Introduction (1-2h) <i>Introduction to the EM&T</i> - Fill in the sign-up form - Check materials: | <i>Key concepts, inspiring talks on envisioning futures</i> | Tutors | Sign-up form [Link] Videos/readings [Link] |

| | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------|----------------------|
| videos/readings/questionnaires/other materials. | | | |
| Part 2: Q&A Session (optional) (1h) <ul style="list-style-type: none"> - Discussion with supervisors and/or experts about the videos and reading materials. - Students prepare questions. | Online group session with all the participants for discussion | Supervisors/ Experts/ Tutors | [Link] |
| Part 3: Collect feedback (max 15 min) <ul style="list-style-type: none"> - Online questionnaire. | Feedback from students | Supervisor(s) Tutors | Feedback form [Link] |

1.4. Suggested technologies to develop the activity

- **Virtual sessions/classroom:** Zoom, Teams
- **Course materials management:** Google Drive
- **Quizzes:** Kahoot!, Quizlet, Google Forms
- **Videos/audios:** Youtube, Vimeo, TED Talks

1.5. Road Map & Timeline of the Pre-mobility activity:

- **Jan - May 2020:** Development of the teaching materials & guidelines of the activity.
- **Mid May - Mid June 2020:** Each partner make the call by sharing an email with their targeted students. For the email, a e-flyer was designed (see chapter 3).
- **Mid June - The end of June 2020:** The instructions on how to complete the activity were sent by e-mail to the students. Each partner was in charge of sending the information and teaching materials to the students that signed up for their EM&T. The students were instructed to complete the activity independently before the 30th of June, 2020. In the following section are presented the specific activity and teaching materials developed by each of the four partner.

2 MATERIALS FOR THE PRE-MOBILITY ACTIVITY BY PARTNER

This section collects the materials developed by the four schools participating in the DATEMATS pre-mobility activity. Please notice that all schools share a general structure of materials shared and filling in a feedback form at the end of the activity. On the other hand, each school had the freedom to develop the activity and materials based on their own specific needs.

The table below shows the total of videos used for the entire activity, divided in pre-existing videos, original videos and videos from other sources.

| EM&Ts | Pre-existing videos | Original videos | videos from other sources |
|----------------------------|----------------------------|------------------------|----------------------------------|
| Wood-based Materials | 1 | 2 | - |
| Advanced Growing Materials | 1 | - | 1 |
| ICS Materials | - | 3 | - |
| Nanomaterials | - | - | 9 |

2.1 EXPERIMENTAL WOOD-BASED MATERIALS EM&T BY AALTO UNIVERSITY

(Overall time of the activity: 60 min)

- **Video 1: Experimental wood-based: INTRO** (3:21 min)
Link: <https://vimeo.com/424081110>
Description: This is an introduction to the Aalto University CHEMARTS approach to experimental wood-based materials & technologies.
- **Video 2: Experimental wood-based: Material Basics** (8:21 min)
Link: <https://vimeo.com/427034893>
Description: Different kind of materials can be derived from trees and wood. Professor Tapani Vuorinen from the Aalto University School of Chemical Engineering presents some of the materials which can be used for wood-based material experimentations.
- **Video 3: IONCELL - from forest to Jenni Haukio dress** (2:39 min)
Link: <https://www.youtube.com/watch?v=1DY9Jd5cCfY>
Description: High quality textile fibres can be produced from wood, recycled cotton or even from paper waste. Several new, sustainable technologies to produce these so called man made cellulose fibres are currently developed, in addition to already existing lyocell and viscose (rayon) processes. This video shows how birch trees are transformed to a luxurious grown by using loncell technology (still on research stage).

- **CHEMARTS CookBook (optional):**

Link: Pirjo Kääriäinen Liisa Tervinen Tapani Vuorinen Nina Riutta (Eds.):
https://shop.aalto.fi/media/filer_public/3b/bf/3bbf53d7-347a-4ca4-a6b1-2479cfde39c2/aaltoartsbooks_thechemartscookbook.pdf

- Basics of wood-based materials (Pages 18-21)
- Scientific material research: principles and practices (Page 24)
- Designerly approach to materials research (Page 25)

- **Aalto Q&A session (optional) - 17th of June from 13h-14h Finland
Time: Eastern European Time (EET)**

Zoom link: <https://aalto.zoom.us/j/66993985645>

2.2 ADVANCED GROWING EM&T BY KEA

(Overall time of the activity: 30 min)

- **Video 1:** An introduction to Material Design Lab and how we work (2:40 min)

Link:https://www.youtube.com/watch?time_continue=2&v=K6_pWA4uP70&feature=emb_logo

- **Video 2:** An introduction to advanced growing materials and how they can be relevant for design - 'Biofabrication' by Suzanne Lee (12:12 min)

Link:https://www.ted.com/talks/suzanne_lee_why_biofabrication_is_the_next_industrial_revolution

2.3 INTERACTIVE CONNECTED SMART (ICS) EM&T BY POLIMI

(Overall time of the activity: 30 min)

- **Video 1: ICS Materials: Materials Experience** (9:27 min)

Link: <http://www.youtube.com/watch?v=4vDVySs2VzM>

Description: "Introduction to materials experience for Dynamic Materials" by Valentina Rognoli, Associate Professor, Polimi, Design Dept. This video presents the theme of the

Expressive-sensorial qualities and Materials Experience as a fundamental dimension to approach materials consciously, looking at them in a designerly way. Interaction with materials libraries and samples, and the fluctuating and dynamic dimension of materials are key topics of the video.

- **Video 2: ICS Materials: Definition and Approaches** (9:03 min)

Link: <http://www.youtube.com/watch?v=F90BgTmdM0c>

Description: "What are ICS Materials?" by Stefano Parisi, Research Fellow, Polimi, Design Dept. This video presents a definition of Interactive, Connected, Smart (ICS) Materials. Their components will be presented and explained using examples and mentioning potential applications. The video provides an overview of approaches and techniques to design with and for these materials focusing on material exploration, ideation, and fabrication.

- **Video 3: ICS Materials: Wearable Domain** (8:50 min)

Link: <http://www.youtube.com/watch?v=NADR4Cbeyc8>

Description: "The use of ICS Materials in Wearable Domain" by Venere Ferraro, Assistant Professor, Polimi, Design Dept. This video shows the use of ICS Materials in Wearable Domain. The terminology about Wearable Technologies is explained. Then, Categories and examples of wearables are presented, demonstrating the opportunities and implications in design and industry. Finally, the connection between wearables and ICS Materials is articulated.

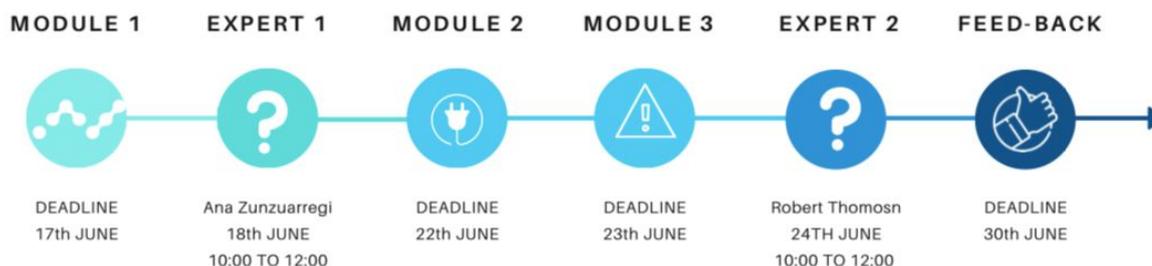
2.4 NANOMATERIALS EM&T BY TECNUN

(Overall time of the activity: 30 min)

The activity is made up of three learning modules:

- Module 1: What are nanomaterials and nanotechnology?
- Module 2: Nanomaterials and their superpowers
- Module 3: Risks of nanomaterials

Each module has short videos followed by a short questionnaire that will help students assimilate the acquired concepts. The following is the timeline of Nanomaterials EM&T by TECNUN pre-mobility activity.



For the complete version of the content of the 3 modules please check annexes: Knowledge transfer method - Nanomaterials by Tecnun (Complete version).

3 THE CALL (REACHED AND REGISTERED STUDENTS)

An electronic flyer was designed to share and reach the students to sign in for the pre-mobility activity (see below). During the call, students were targeted by each of the four school individually in their school. The key criterias were students interested on the topic of new materials & technologies, as well as students from the last years of their undergraduate programme or in the beginning of their master's studies.



PRE-MOBILITY ACTIVITY

Would you like to explore some of the latest emerging materials and technologies?

DATEMATS is a design-driven European project for sharing and transferring knowledge of emerging materials and technologies. We invite you to join the first study pilot for online learning of one of the four DATEMATS areas:

- **Experimental Wood-Based EM&Ts by Aalto:** Materials that are processed either chemically or mechanically from trees or other plants for innovative applications.
- **Nanomaterials EM&Ts by Tecnun:** Entirely carbon-based materials, nano-scaled structures or composite.
- **Advanced Growing EM&Ts by KEA:** Materials from a controlled cultivation of organisms (bacteria, yeast, algae, mycelium, etc.)
- **Interactive Connected Smart (ICS) Materials EM&Ts by Polimi:** stimuli-responsive materials and electronic micro-devices embeddable into clothing or worn on the body as implants or accessories.

Which EM&Ts are you interesting in?

The aim is to introduce, inspire and envision how these advanced materials and related technologies could make life easier and more comfortable in the future. The approach will be blended, including videos and optional virtual learning sessions.

Dates: 01.06.2020 - 30.06.2020

Workload: approx. 3h

Inscriptions: <https://forms.gle/j8wi1YQA6ru74u4u7>



Co-funded by the
Erasmus+ Programme
of the European Union



DATEMATS project (Knowledge & Technology Transfer of Emerging Materials & Technologies through a Design-Driven Approach Agreement Number: 600777-EPP-I-2018-I-IT-EPPKA2-KA) is co-funded by the Erasmus+ programme of the European Union.

The table below presents the initial set goals in total and by individual EM&Ts, the number of registered students & students that filled in the feedback form (the closing activity and the way to know how many students completed the pre-mobility activity).

| EM&Ts | Goal | Registered | Finalised |
|---------------------------------------------|-------------|-------------------|------------------|
| Experimental Wood-Based Materials | 30 | 32 | 27 |
| Advanced Growing Materials | 30 | 38 | 27 |
| Interactive Connected Smart Materials (ICS) | 30 | 41 | 28 |
| Nanomaterials | 30 | 31 | 10 |
| Total | 120 | 142 | 92 |

For the registration, students needed to fill a eight questions form developed in Google Forms. In the form they were asked: 1) email, 2) name and surname, 3) University, 5) Course of study and year of enrollment 6) EM&Ts option 1 (first preference), 7) EM&Ts option 2 (second preference), 8) Why are you interested in attending this activity? What do you expect from this activity?.

The following are some examples of the comments of the students that signed up for the pre-mobility activity. The answers presented here relate to the questions: “Why are you interested in attending this activity? What do you expect from this activity?”.

- “Interesting new field of materiality!” - (Nanomaterials student)
- get to know something new to experiment in the future. Learn and discover
- “...My expectations from this activity is to become aware of new possibilities, learning about specific materials and technologies which i just heard about.” (ICS student)
- I expect to learn from new material universes and possibility of application of this into de the design of products that are more naturally and consciously produced. (Wood-based student)
- I am very keen on materials and new ways to develop new ones, and I am deeply curious about this new method of sharing knowledge and informations. Moreover, I find it a great opportunity to get to know foreign design realities and teaching methods. (Wood-based student)
- “I want to know more about the new technologies, and possibilities for the future materials. Im especially interested in cultivation of organisms. I expect interesting lectures and examples. I think this is a rare opportunity to learn about the topic.” (Advanced Growing student)

In general, the majority are interested in gaining more knowledge about the new materials and technologies, as well as how these developments are having different implications in nowadays products and environment. To see all the comments check annexes 3.2 DATEMATS Signed-up Form (142).

4 RESULTS AND CONCLUSION

The 142 students that signed up for the Pre-mobility activity were instructed to fill in the feedback form in order to know how many of them completed the activity, as well as to get to know their perspective on the course. For the development of the feedback form were used qualitative and quantitative methods such as Likert Scale and open-ended questions.

Below, some of the answers given by the participants to the questions are presented in graphs. Further, some examples of the students written answers are shown. Finally, an assessment of the pre-mobility activity is reported by listing a number of strengths, as well as things to improve based on the given feedback from the students. For more detailed information please check annexes 3.2 DATEMATS Feedback Form Pre-mobility activity (92).

4.1 FEEDBACK FORM GRAPHS

LINK: <https://docs.google.com/forms/d/e/1FAIpQLSfMK-M7EJFwcPITCu-u-wN4Xo5kQfUuKsONwlg5qiOB16wJw/VIEWFORM>

Which EM&Ts were you part of?

100 respuestas

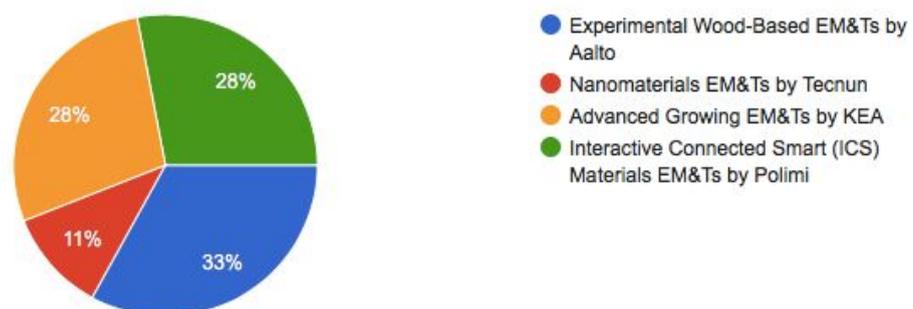


Fig. 1. Percentage of students participating by EM&Ts

My overall assessment of the pre-mobility activity E=Not applicable, 1=Fair, 2=Satisfactory, 3=Good, 4=Verygood, 5=Excellent

100 respuestas

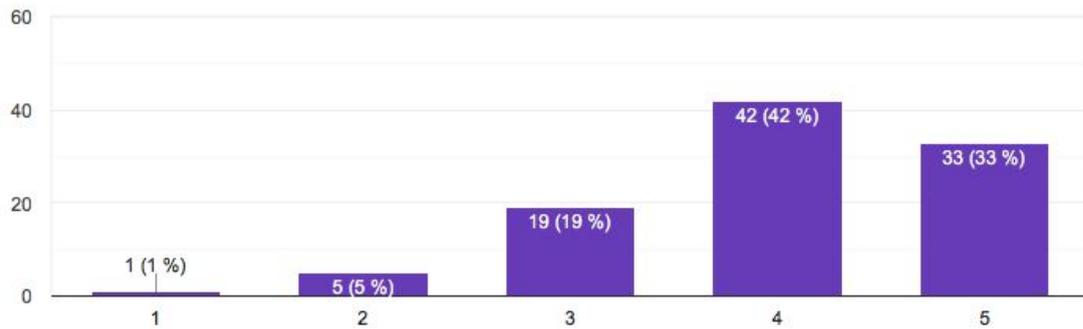


Fig. 2. General assessment of the 3.2 Pre-mobility Activity by participants

What is your previous knowledge on the EM&Ts area before the beginning of the activity
1=None, 2=Scarce, 3=Sufficient, 4=Good, 5=Expert

100 respuestas

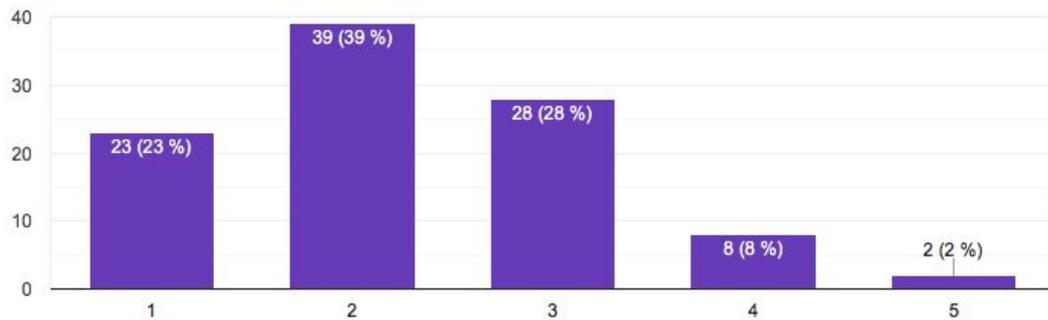


Fig. 3. Previous knowledge of the participants in the Pre-mobility Activity.

The video(s) as a teaching method supported my learning E=Not applicable, 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree

100 respuestas

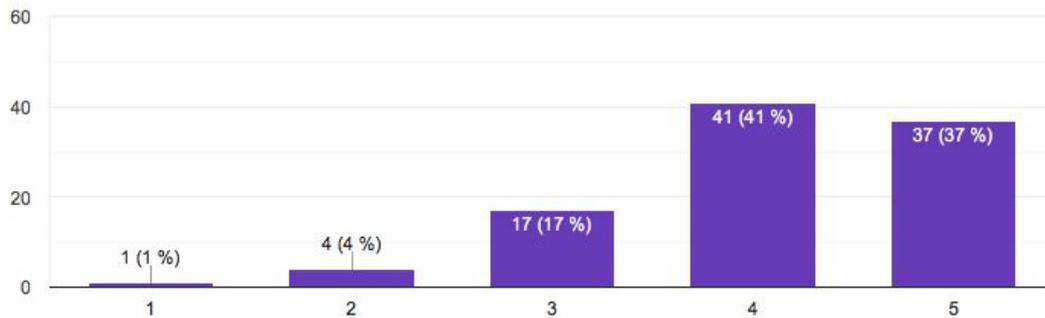


Fig. 4. Assessment by participants of the videos as a teaching method.

The discussion(s), exploration(s) and/or assignment(s) method(s) supported my learning (if applicable) E=Not applicable, 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree

85 respuestas

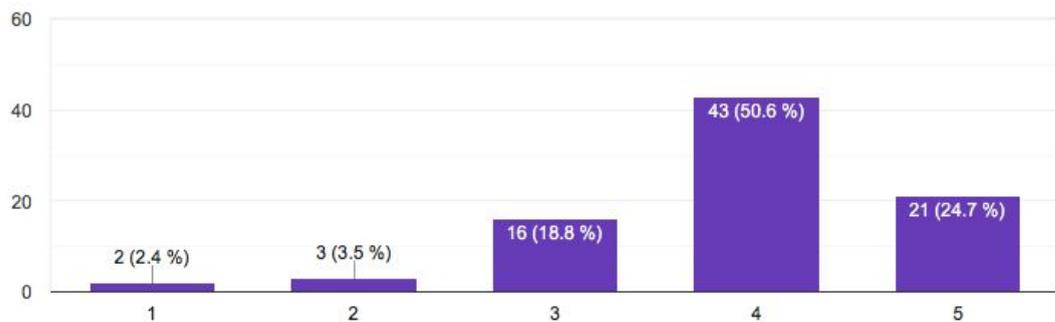


Fig. 5. Assessment by participants of the other possible teaching methods such as discussions, readings.

Did the pre-mobility activity meet my expectations? E=Not applicable, 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree

100 respuestas

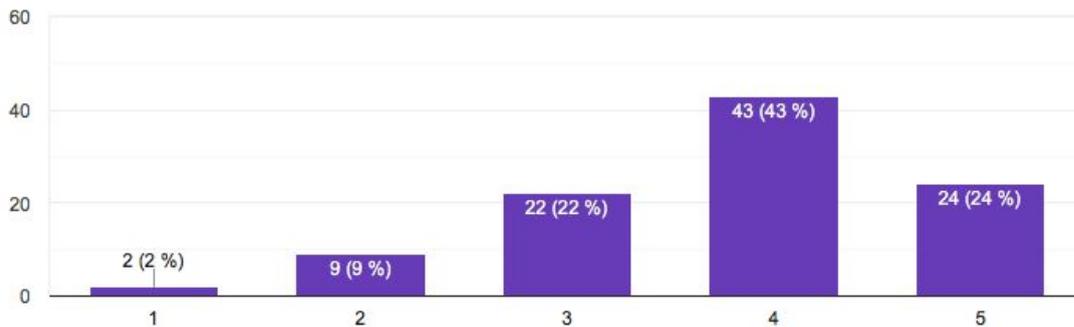


Fig. 6. Evaluation by participants in connection with their individual expectations

- **Why did the pre-mobility activity meet my expectations?**

Examples of the answers given by the students to this question:

- "I have learned about new materials and new technologies that would be useful for me in the near future. For instance, i have never heard about ICS materials and now I have an idea about what they are." (*ICS student*)
- "I was expecting more video with more knowledge, but it's probably because i didn't understand how does it works. Anyway the information in the videos have been really useful and let me became more curious about the argument." (*ICS student*)
- "I did learn a lot about nanomaterials and I'm very grateful. It would be even better to learn about the techniques or how you apply these nano materials on industrial products. I especially enjoyed the zoom meeting with Robert From Materfad." (*Nanomaterials student*)
- Before watching the videos I supposed what "Advanced growing" could be, but now I've strengthen my suppositions and really started to understand how does it work and see the power it has. (*Advanced Growing student*)
- "The pre-mobility activity met my expectations due to the fact that I found the biofabrication of materials and learning about new materials very interesting as well as finding creativity and inspiration for new further projects. Furthermore, I think that the lab testing is the perfect combination of technology and science." (*Advanced Growing student*)
- "I was expecting there are more information about certain of growing materials in detail." (*Advanced Growing student*)

- I really enjoyed the videos and was really surprised by the possibilities "biofabrication" offers. I honestly wasn't expecting this activity to be as fun and informative as it turned out to be. Can't wait to learn more! (*Advanced Growing student*)
- It Was really good to be able to take part to this activity, first of all because it gives a hint and a first view of the project, explaining in few minutes a beautiful concept of Sustainable production. It was really awesome to discover things I was not aware of, and to go deeper on a topic I am really passionate about. Thank you. (*Wood-based student*)
- this experience met my expectations, especially after reading the "cookbook" which I found very interesting, in fact it not only offers theoretical knowledge but also small recipes that allow you to experiment on new materials. (I'm already trying to do some experiments from home) (*Wood-based student*)

- **General comments and suggestions (on such matters as materials, teaching methods, arrangements, ways of completing the pre-mobility activity and unnecessary overlaps with other course contents, or other matters).**

Examples of the answers given by the students to this question:

- "It would be very interesting to see the process of how those materials are grown and the manufacturing process"
- "I already knew the TED talk of Suzanne Lee but it is always a pleasure to hear her speaking and i think it is the best possible introduction to the theme. Maybe to value hands on experience it would be nice to receive some instructions to experiment with biomaterial at home (if possible)"
- "In my opinion these videos, as a first contact with the subject, are instructive enough. In Tecnun we have a subject of Biomaterials and Biocompatibility but we study it in general so it doesn't overlap any course contents, just increase students learning and information."
- "I would do some questions about the videos to realize if we had understood the information given."
- "It will be nice a group online meeting to understand the people that it is involved."
- "Sharing a list of recommended bibliography and stating the goal of the pre-mobility assignment would help. Also having questions that open up thought and discussion on the matter would be interesting. Otherwise I really enjoyed Suzanne Lee's talk."
- "As I have said before, I think the way in which this lesson has been taught really good. Mainly because they have been practical videos with clear explanations and really related to real situations. For example, in the third video it has been shown the complete transformation from forest to fabric so I think the teaching method is really good."

- “It was a good activity to discover the topic, although I would like to have more bibliography and (optional) activities to do. The teachers from Aalto university were really nice to offer a zoom call where we could ask anything we need and they answered really open and with pleasure. I would like to have more information about these courses and get notified if there's a mobility activity. Thank you”
- “The content was interesting, and I think the teaching methods taken were fine and adequate. The videos were a good choice and very helpful. Good job! If I had to change something I would have liked to see more different teachers or professionals on the videos.”
- “As we subscribed to the activities, it was not very clear how the whole activity was going to be. Unfortunately, I could not attend the Q&A session, and from the website I didn't quite understand it as well. For what concerns the videos, as a first introducing phase they are ok, but maybe it would have been nice to get to watch them also before choosing a course.”

4.2 ASSESSMENT OF THE PRE-MOBILITY ACTIVITY

The assessment has been divided into strengths and things to improve. The set goals and objectives are evaluated, as well as the feedback from the students. For the qualitative data collected from the students' feedback codes were developed and applied by identifying some key topics, key words, patterns and making groups. The information presented here will be considered for later to be included in the next action - D 5.2 mobility activity.

Strengths of the Pre-mobility activity:

The following are the positive achievements reached during the development of the pre-mobility activity.

- Partners' objectives:
 - The set goal of selecting 120 students (minimum 30 by EM&T area) to join the DATEMATS pre-mobility activity was accomplished. 142 students signed up for the activity. Nonetheless, not enough students signed up for the Nanomaterials EM&T area. In this case, 15 students that marked

nanomaterials as their second EM&T option were reallocated based on the answers participants gave to the Question: “Why are you interested in attending this activity? What do you expect from this activity?”.

- The four partners submitted the teaching materials on time. However, the initial DDL for the delivery of the videos was modified in view of the fact that the four schools were facing several and sudden changes due to COVID situation.
 - The videos were the main source of teaching method. Based on the answers given in the feedback form, the major number of the participants say that the videos support their learning process (50,6% agree, followed by 24.7% strongly agree).
 - Other teaching materials such as readings were also important to complement the learning activity. For example, various students mentioned that The CHEMARTS Cookbook from Aalto University is a adequate learning tool to start experimenting with materials in a feasible way.
 - Aalto and TECNUN Universities organised virtual sessions with experts on their EM&T topics. During the discussion students had the opportunity to solve questions related to the shared teaching materials and move deeper into the different key concepts. Several comments from the students highlighted the importance of this type of spaces to get to know the people behind the activity and to solve questions. On the other hand, students that did not have this online space in their learning activity recommended to include one.
 - Lastly, a simple and concrete feedback form developed in Google forms was a suitable tool for collecting the evaluation of the pre-mobility activity from the students. More detailed explanation of the results of the feedback form are stated below (Students’ objectives).
- Structure, guidelines and implementation:
 - The proposed structure based on 3 parts: 1) introduction & inspiration, 2) online Q&A session (optional), 3) students’

feedback was adequate and fitted the four EM&T areas. Based on the students feedback, it is recommended that the second part of the structure - “online Q&A session” is not optional but mandatory for the four partners.

- Email was an effective channel for managing the guidelines between partners. Particularly, for making sure the right and on time implementation of the pre-mobility activity. It allowed to answer specific and immediate concerns that the partners had for the fulfillment of the activity.
 - Email was also a successful channel to share instructions and learning materials with the students. Those participants that had concerns were able to reach activity leaders and solve their questions in a short period of time. Additionally, each of the four schools were in charge of sending the materials to the students that signed up for their EM&T area. It was functional to share the responsibility with each of the school partners for the implementation of their specific EM&T area activity. Specially because students were able to contact the EM&T leaders directly if they have any concerns.
- Students’ objectives (feedback form results)

These objectives are evaluated based on the answers given in the feedback form. For the analysis of this data the coding method is implemented. They were classified in 3 groups in connection with the 3 main students’ objectives (see page 5).

Group 1: Learning methods

- *Video*: This word is mentioned 87 times.

In general, students highly appreciated the use of videos as a teaching method for introducing a new topic - new materials and technologies. They acknowledge the quality of the produced videos (appropriate length between 2-15 min, suitable information, capture students’ attention, easy way to understand...). Also, the videos coming from other sources were

proper for the activity. Some participants highlighted how the videos are to a certain point complementary with the online meetings with experts on the topics discussed in the videos.

- *Online meeting/session/discussion/conversation:* These words are mentioned 13 times in total.

There were also 4 students that mentioned how much they appreciated and learned from available online sessions. Mainly, participants highlighted the relevance and value that will add if they could have the opportunity to assist to one of it.

- *Material(s):* This word is mentioned 112 times.

Firstly, the major number of students that mentioned this word is related to the objective of the activity: learning about new materials and technologies. Secondly, participants mention this word aiming to have possibility to touch with their hands and experiment with the materials. For instance, a few of the students would like to be able to see and experience the process of growing and manufacturing the materials.

Group 2: Familiarising & get inspired

- *Positive expression (Interesting (42)/ Enjoyable(2)/ like(v)(9), well(13)/ new(10)/ happy(1)/ perfectly(2)/ meet/met my expectations (13)/ successful (1)/ awesome(1)/ discover (3)/ inspiration (3)/ go deep in things(2)/ great(11)/ enriching(1) /high quality(1)/ informative(3) /appreciated (2) /has helped(7)/ encouraging(1)/ satisfied(3)/ looking forward (1)/ great (1))* These words are mentioned 133 times in total.

Nearly all participants expressed positive words in relation to the teaching materials and the pre-mobility activity. The videos received many positive comments. Particularly, students considered the activity informative, clear and inspired them to learn further about the new materials and technologies. A student

discussed about the timeline of the pre-mobility. They liked that the activity has a DDL but not other fixed dates.

- *Constructive feedback (I think/thought that (4)/ I was expecting (2)/ more in-depth (4)/ more information (3)/ there could have been something more (2)/ disappointed (3)/ would be interesting/nice/good/great (6)/ would like to (3)/ Suggest (3)/ I wish (1)/ could have (1)/ should (2)).* These words are mentioned 34 times in total.

Various students suggested to add more content and details that talks about the specific and available materials and tools to experiment. A suggestion that was repeated a couple of times was to show in the videos case studies and present projects that are being developed in order to “deepen on the existing knowledge”. Mainly students asked for more bibliography, light readings, slides, tutorial to carry some experiments.

The following are some of the comments that students made related to this topic: more information about “how the materials can be applied and processes”, “how to work with the materials, instructions to experiment with materials at home”.

Another topic mentioned several times was having the opportunity to participate in an online session with professors and experts. A student consider that having the possibility to make questions is key in the learning process. Another participant would like to do an experiment with the materials before the online session to discuss about it with the teachers. This subject matter is extended below (see suggested improvements for the mobility activity).

Group 3: Envisioning

This group has difficulties to be coded because the words used or expressions variate from person to person.

- *looking for (2)/ to learn more (4)/ future (8)*. These words were mentioned 14 times in total.

There were not that many students that expressed words in the feedback form related to how they envision how advanced EM&Ts materials and technologies could make life easier and more comfortable in the future. However, the participants that talked about this topic referred to the importance of these materials in the near future and the preferable impact they could have in the environment. A recommendation is to include a question in the feedback form focus on this specific topic.

Suggested improvements for the mobility activity:

Specific recommendations for each of the four schools (It is important to highlight that the schools had difficulties for developing the materials and making the call due to COVID situation.)

- TECNUN: It is recommended to organise a larger call towards students that can be interested on nanomaterials. One possibility could be sharing the call with students from other programmes and faculties. In this case, the activity can have a wider number of students interested and applying to this specific EM&T area. Another important topic to revise are the reasons why only 10 students filled in the feedback form. Finding a way to keep in contact with the students while they develop the activity could be a way to motivate them to finish the activity. On the other hand, having a closer look to the learning materials could also be beneficial to see if that could have been the reason for not finalising the activity. Checking the length of the activity and the amount of “tasks” given to the students. One participant commented that some of the videos were overlapping information and would like to see similar structure in the videos to give a flow to the content.

- KEA: Even though students liked the selected learning materials from Advanced Growing EM&T, they suggest to deep more in the materials side. A student commented that the video of the KEA University Lab “felt more like advertisement”. In addition, the TED videos and pre-existing videos are always a risk. It may happened that some of the students have already watched them. For instance, there is a case of one student that said that he already watched the 2 videos provided by KEA for the activity. Furthermore, a couple of students suggested that would like to add to the learning materials a Q&A Session to have a conversation with professionals in the area.

- Polimi: A suggestion given by a student for the teaching methods from Polimi is to have “more dynamic videos”. A few students commented that they would like to see more visuals than the speaker. The voice could be used over the images and have subtitles. Additionally, some participants would like to see more concrete and practical examples of the research, e.g. case study and present projects. A student commented “no need of high quality videos - e.g. a casual talk. subtitles.” A couple of students would also like to have a Q&A Session.

- Aalto: A student recommends to “show the materials instead of the person holding the materials and use the voiceover.” Another student ask for “more professionals and professors in the videos to learn more than just the basic notions of the topic.” For The CHEMARTS Cookbook, some of the participants suggested to make videos as a guided experiments with some of the recipes. In addition, some students would also like to work with recipes before the Q&A session because they could use this space to ask concerns related to their experiments.

General recommendations

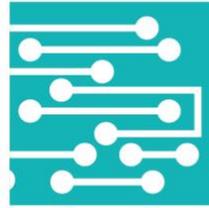
- The pre-mobility activity appears to be adequate for introducing the topic to those students whom know little or nothing about the DATEMATS new materials and technologies. It should be clear when making the call that it is an introductory activity. A few of the participants had already knowledge on the topic and felt that the activity did not supported their learning process.
- Make clear the objective of the activity to add clarity to purpose of the activity when sharing with the students.
- Go deeper than just general information, more details and fact of the materials that the areas are using.
- Another recommendation given is to have various time-slots for the online discussions. It is for the reason that sometimes the first suggested time may not match with the students' schedule.
- Questionnaires after watching the videos could be added in order to ensure that the topic was well understood.
- Sharing a list of recommended bibliography as part of the learning materials was highly suggested.
- Change from optional to mandatory the development of online Q&A session by the partners. A significant amount of students mentioned the importance of this type of learning spaces to complement the introduction given by the videos and solve questions. Various students that did not have online discussion in their learning activity recommended to include one.

To sum up, even though the activity was mainly developed during the COVID situation and adjustments to the timeline and teaching materials were necessary to made, the goal and objectives set for the 3.2. Pre-mobility activity were met. The core goal of 120 students participating in the activity was reached. At the end, it finished with 142 students that signed up for the pre-mobility activity. However, the number of students

that completed the activity and filled in the feedback form was lower, 92. The evaluation and comments related to the pre-mobility activity were rather positive. The majority of the participants (42%) assessed overall the activity as “4=very good”, followed by 33% that evaluated as “5=Excellent”. The greatest part of the students agreed that the materials developed such as videos and discussions supported their learning process. There are also several suggestions like the ones stated earlier. The recommendation will be evaluated and included for the development of the next step - The mobility activity in spring-summer 2021.

5 ANNEXES

- Knowledge transfer method - Nanomaterials by Tecnun (Complete version)
- 3.2 DATEMATS Signed-up Form (142)
- 3.2 DATEMATS Feedback Form Pre-mobility activity (92)



Datemats
www.datemats.eu

@datematseu
#datematseu