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**Digital literacy enables up-to-date sleep medicine in inclusive healthcare**

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**Document: Assessment of the Social Innovation Incubator**

Developed by the *Mediterranean Economic Foresight Institute (Activity 4.4. lead), E.C.H.R. Ltd. (NetHub), Reykjavik University, University of Crete, University of Split*



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## 1. Introduction: From Crete to Split – A Journey through Two Innovation Sprints in Social Innovation Incubator

The eSleep\_dHealth Social Innovation Incubator was designed as an intensive, hands-on experience where interdisciplinary student teams learned to co-create innovative solutions in sleep medicine. Across two sprints during two learning expeditions— the first in **Heraklion, Crete**, and the second in **Split, Croatia** – students from the University of Split, the University of Crete and Reykjavik University applied design thinking to real-world healthcare challenges, combining creativity, empathy, and evidence-based reasoning.

The **first sprint in Crete** focused on the critical issue of **adherence to CPAP therapy** among patients with sleep apnea. Over five fast-paced days, students learned how to define user needs, explore emotional and behavioural barriers, and design interventions that could motivate patients to continue therapy. Working in mixed teams, they mapped user journeys, formulated “How Might We” questions, and rapidly ideated potential solutions. The sprint concluded with the creation of low-fidelity prototypes and user testing sessions, revealing deep insights into patient motivation, comfort, and trust in medical technology.

The **second sprint**, hosted in Split, extended this experience into a broader societal context under the theme: **“New ways and tools for the entire community to recognise signs of sleep apnea and seek medical help.”** The second sprint was combined with the Erasmus+ Blended Intensive Programme: Sleep Medicine in the Digital Era.

The programme brought together 35 students and 11 professors from five European institutions for a week of interdisciplinary learning combining sleep medicine, digital health, and social innovation. Held at the Mediterranean Institute for Life Sciences (MedILS), the programme featured lectures, workshops, online assignments, field visits, and cultural exchanges, fostering collaboration and creativity among participants.

The programme was also linked with the Postgraduate Specialist Study in Sleep Medicine at the University of Split – the only one of its kind in the region – through the module Societal, Economic, Organisational, and Research Aspects of Sleep Medicine, delivered by leading European experts.

Students entered the Split sprint after completing a **Summer-in-Cloud** preparatory phase – an online learning and research period during which they developed **Opportunity Analysis Reports**. They had the opportunity to conduct research and interview sleep medicine experts, patients, and community members. This involved exploring digital tools, awareness campaigns, and sociocultural barriers to early diagnosis. This preparatory work deepened their understanding of sleep health and equipped them to define sharper, more inclusive challenges for the in-person sprint.



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During the Split expedition, participants built on their research to design and test innovative community-level awareness solutions. Following the structured **innovation sprint process**, teams:

- Working in mixed teams, they mapped user journeys, formulated “How Might We” questions, and rapidly ideated potential solutions through structured exercises such as Crazy 8s.
- Created detailed **Solution Concept Maps**, turning insights into step-by-step visual storyboards;
- Built **just-real-enough prototypes** using simple tools such as presentations or storyboards.
- Tested these prototypes with patients to observe authentic reactions and gather feedback from the end-users.

The sprint culminated in a **Pitch Presentation**, where each team presented its tested idea to a panel of mentors and experts. This final reflection stage encouraged critical analysis of what worked, what failed, and what might be developed further – aligning with the project’s goal of transforming uncertainty into validated insight.

Together, the Crete and Split expeditions formed a continuous learning arc:

- from **individual behaviour change** (supporting patient adherence),
- to **collective awareness and early recognition** (engaging communities).

Both sprints exemplified the core principles of the design sprint methodology: **time-boxed collaboration, user-centred design, teamwork, and end-users and expert feedback**. Through this experience, students not only contributed to tangible health innovation ideas but also developed essential skills in empathy, teamwork, and communication – vital competencies for future professionals in digital health and precision medicine.



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## 2. Why is the Assessment of Social Innovation Incubator critical?

Structured assessment of the implemented Learning Expeditions – which functioned as **social innovation incubators** – is essential for understanding and demonstrating their educational and societal impact. Since most of the assessment data come directly from **students' reflections and self-evaluations**, they offer authentic evidence of how participants perceive their own learning, collaboration, and growth as changemakers. Self-reflection is not only an assessment tool but a key component of the learning process itself – it enhances metacognitive awareness, helps students internalize experiences, and supports the development of empathy, creativity, and critical thinking.

Systematically analysing these reflections and outcomes provides a solid foundation for **evidence-based learning interventions** aimed at improving higher education programmes. The collected data help identify what works, for whom, and under what conditions – generating actionable insights that can inform curriculum design, teaching strategies, and student engagement practices. Moreover, such structured assessment results offer a strong argument for **institutional leaders and policymakers** to recognize the value of integrating social innovation incubators – like these Learning Expeditions – as a **regular and sustainable part of undergraduate and graduate education**. In doing so, higher education can move toward more experiential, student-centred, and socially responsible models of learning that connect knowledge with real-world impact.

### 3. The methodology used for the Assessment

In the assessment phase of the Learning Expedition, participants were invited to reflect on their personal and professional growth through a structured **self-evaluation survey**. For each statement, they were asked to rate their perceived level of ability **before** the Learning Expedition (“Then”) and **after** completing it (“Now”). This approach enabled students to capture their own sense of progress and increased confidence across key competencies such as teamwork, creativity, communication, empathy, and problem-solving.

The use of “Then” and “Now” self-assessment questions enables a more accurate and less biased reflection of students’ learning progress. When participants evaluate their skills only after completing the Learning Expedition – first recalling how they perceived their abilities before (“Then”) and then assessing their current level (“Now”) – they do so with a clearer understanding of what each skill truly entails. At the beginning of the programme, students may overestimate or underestimate their competencies due to limited real-world experience or a lack of reference points. However, after being exposed to complex, authentic challenges within the social innovation incubator, they gain a more realistic perspective of the knowledge, teamwork, and problem-solving skills required. This retrospective self-assessment method helps correct initial misconceptions and captures genuine growth in awareness, confidence, and capability. As such, it provides a more valid measure of learning outcomes, aligning perceived development with the actual depth of experience gained through applied, experiential learning.

A **five-point scale** was used to measure this development: 1 = Not at all confident | 2 = Slightly confident | 3 = Moderately confident | 4 = Very confident | 5 = Extremely confident.

By comparing their “Then” and “Now” ratings, students were encouraged to reflect deeply on how the experience shaped their skills and mindset. This **reflective, student-centred method** not only provided valuable qualitative and quantitative data for programme evaluation but also reinforced self-awareness as a central part of the learning process – helping participants recognize their growth as future professionals and social innovators.

Finally, we had open-ended questions for a short essay on their experiences.



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## 4. Results of the Assessment

### 4.1. Section A – Skills & Abilities

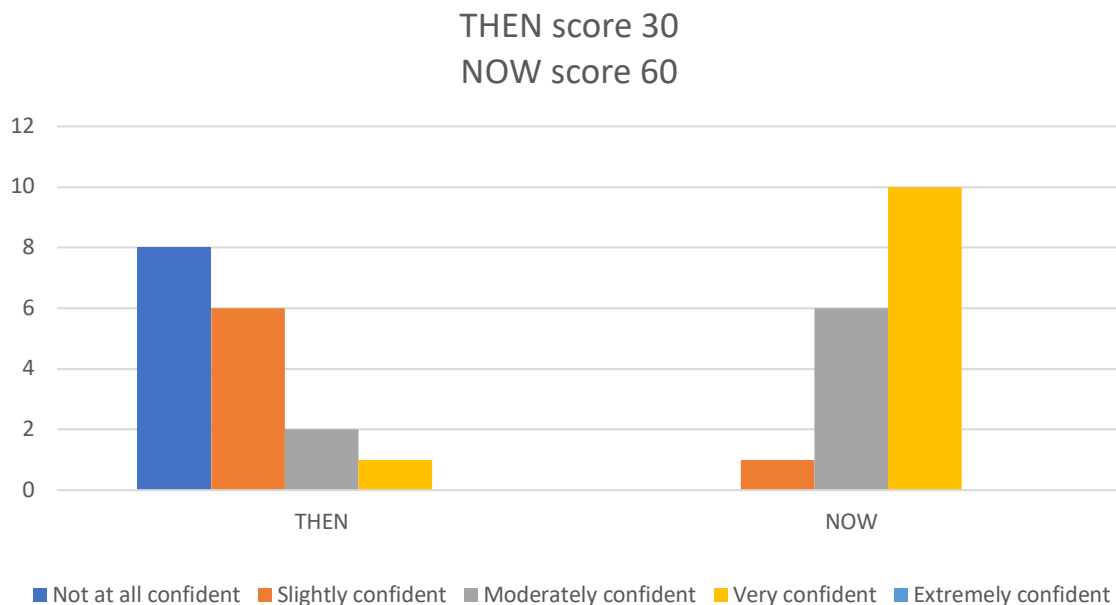
The method to quantify the “Then” point and “Now” point was to assign to each answer a numerical value: 1 - Not at all confident; 2 - Slightly confident; 3 - Moderately confident; 4 - Very confident; 5 - Extremely confident.

This allowed us to identify that the students evaluated themselves lowest for the statement: “I can prepare and deliver an effective pitch of an innovative solution.” Also, this was the statement that resulted in the highest score difference between “Then” and “Now”, confirming that students feel confident in the skills they acquired.

The statement that students evaluated themselves highly in “Then” and thus, which also resulted in the lowest difference between “Then” and “Now”, was: “I can adapt my communication style when working in multicultural teams”.

Here is the complete list of scores for the survey questions:

1. I can identify opportunities for innovation in sleep medicine.



Source: Assessment of the Social Innovation Incubator survey

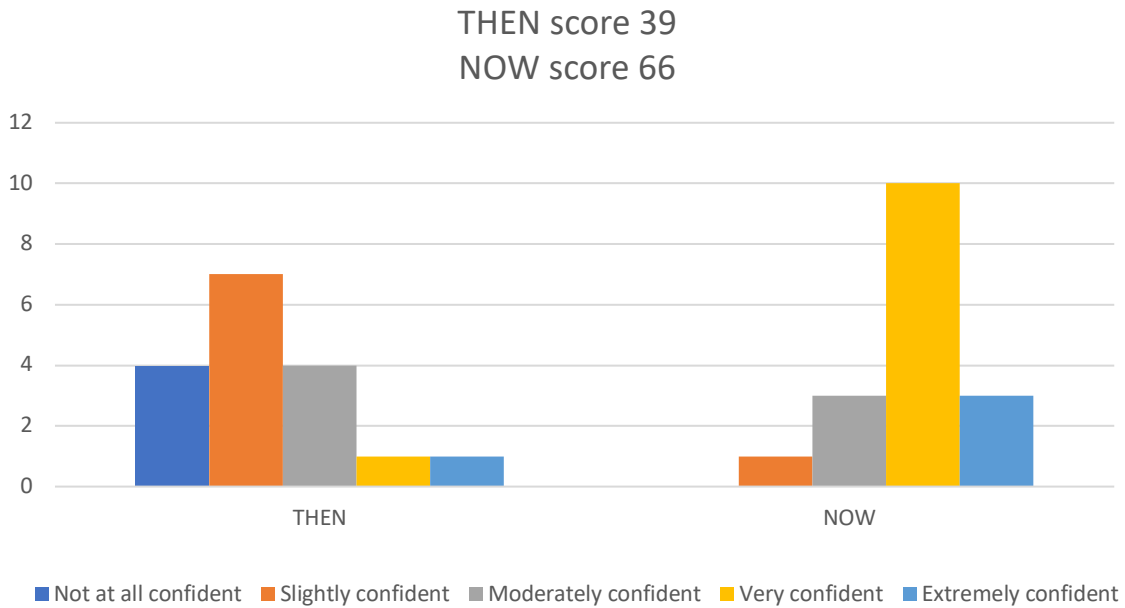


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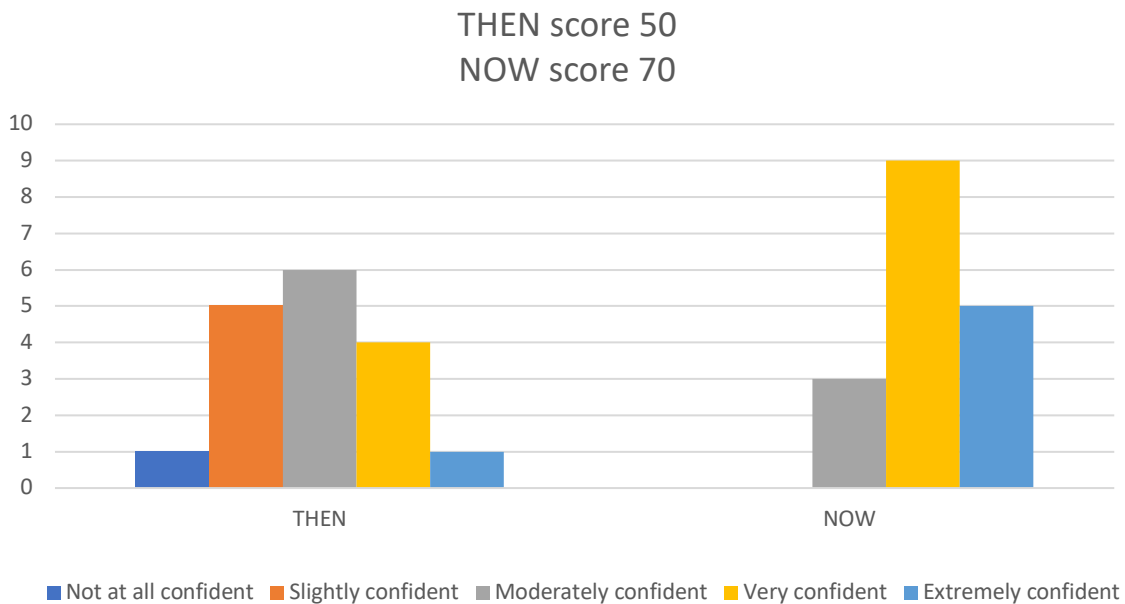
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## 2. I can apply a **user-centred approach** to understanding patient or caregiver needs.



Source: Assessment of the Social Innovation Incubator survey

## 3. I can work effectively in **interdisciplinary and international teams**.



Source: Assessment of the Social Innovation Incubator survey



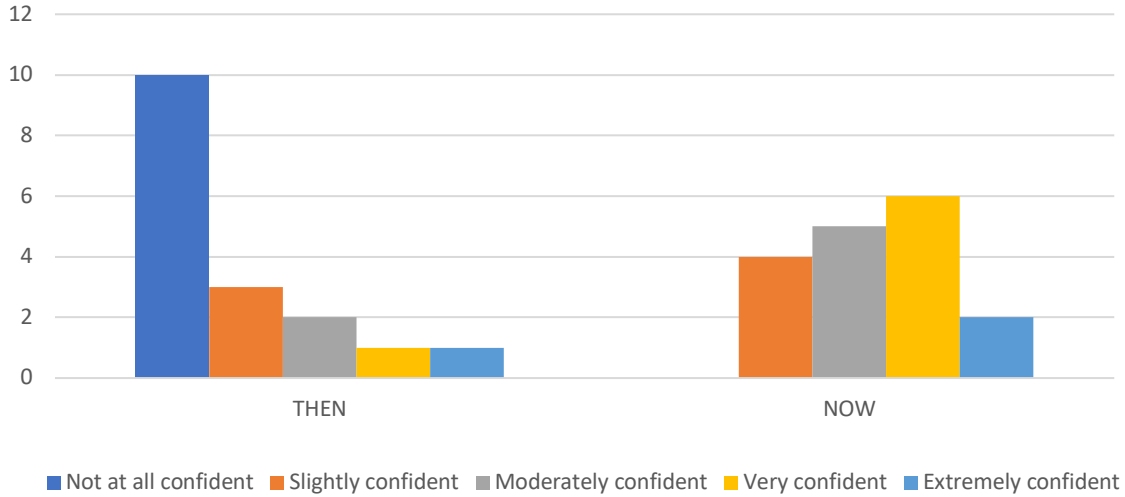
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4. I understand the entrepreneurial mindset necessary to drive digital health innovation.

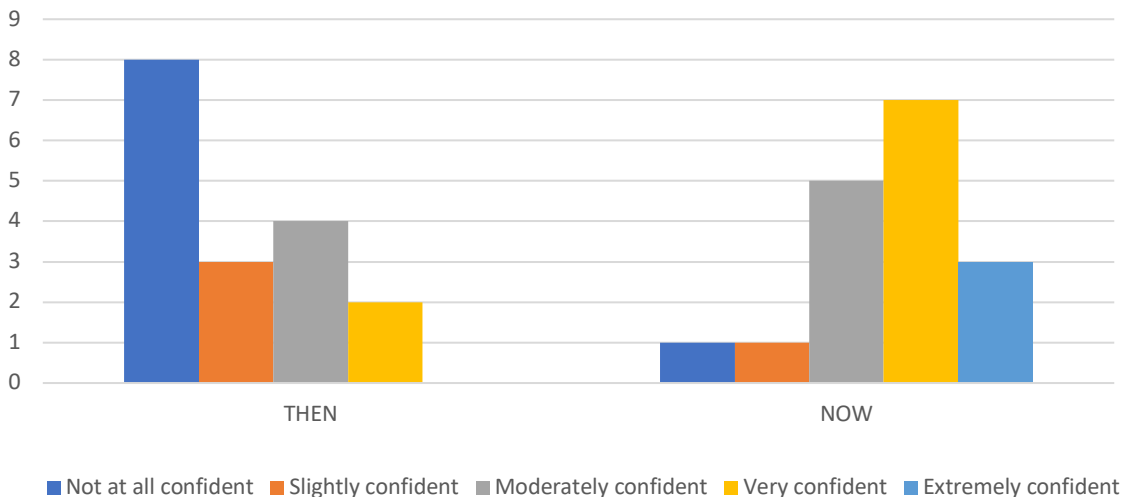
THEN score 31  
NOW score 57



Source: Assessment of the Social Innovation Incubator survey

5. I can apply user-centred thinking **methods** to co-create solutions for health challenges.

THEN score 34  
NOW score 61



Source: Assessment of the Social Innovation Incubator survey



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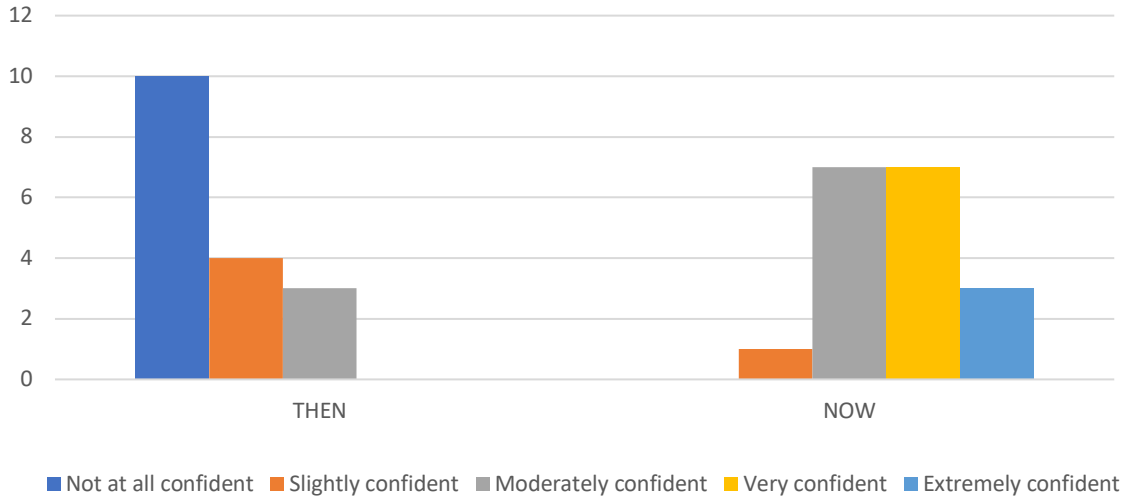


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7. I can prepare and deliver an **effective pitch** of an innovative solution.

THEN score 27

NOW score 61

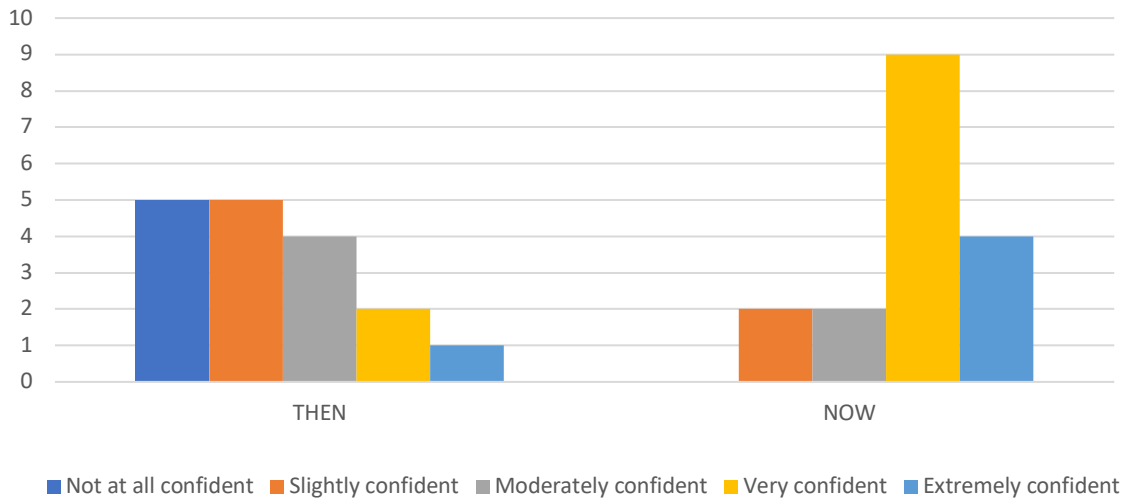


Source: Assessment of the Social Innovation Incubator survey

8. I can **conduct and analyze user interviews** to generate insights.

THEN score 40

NOW score 66



Source: Assessment of the Social Innovation Incubator survey



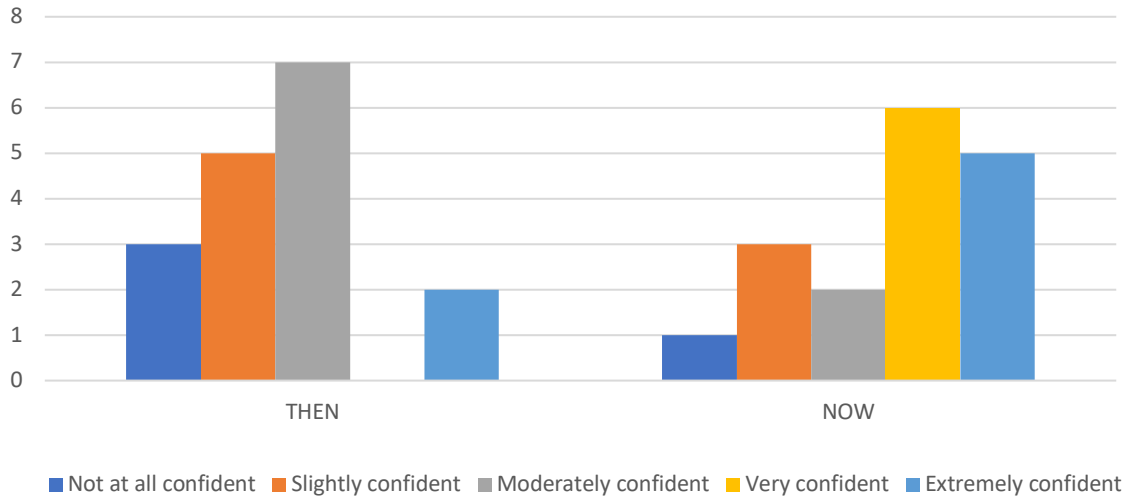
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9. I can **visualize solutions** through sketches, storyboards, or simple mock-ups.

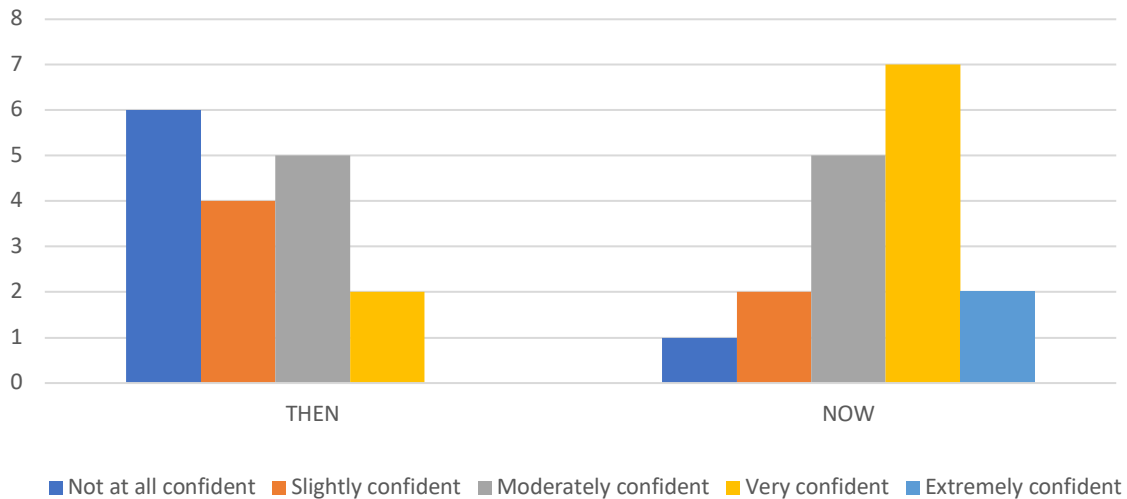
THEN score 44  
NOW score 62



Source: Assessment of the Social Innovation Incubator survey

10. I can **recognize achievable innovative ideas** and design ways to test them.

THEN score 37  
NOW score 58



Source: Assessment of the Social Innovation Incubator survey

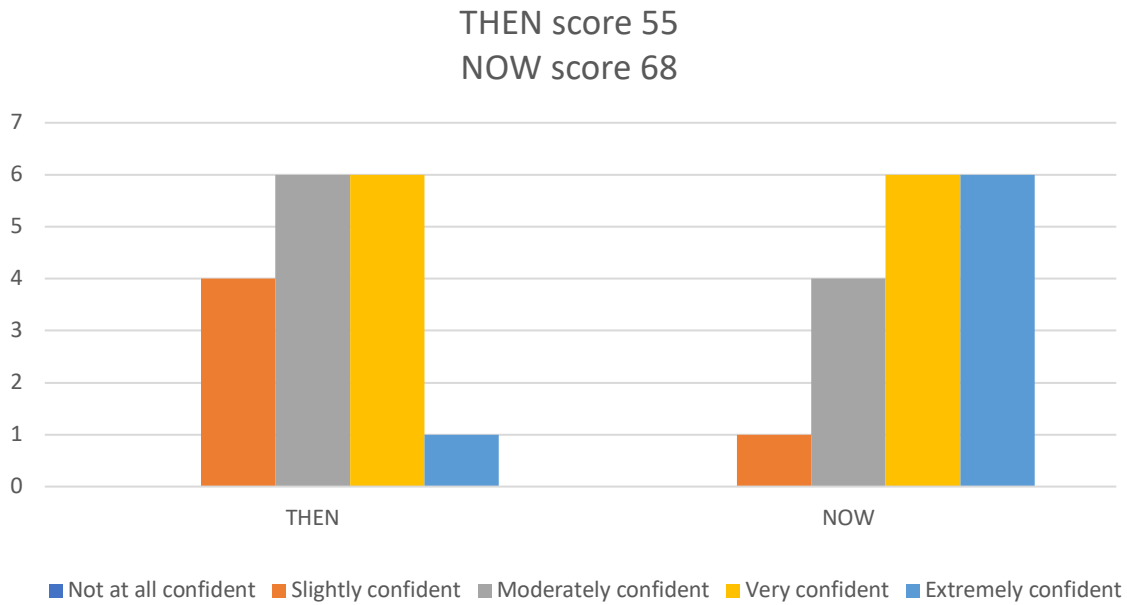


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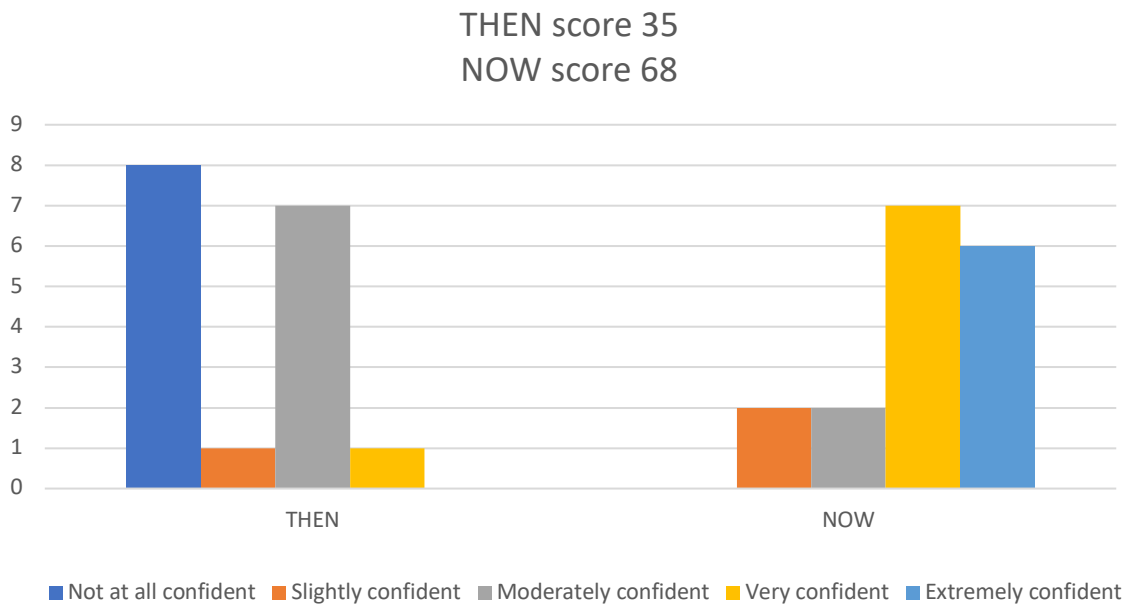
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### 11. I can adapt my communication style when working in multicultural teams



Source: Assessment of the Social Innovation Incubator survey

### 12. I understand how CPAP adherence challenges connect to broader issues in ageing and digital health.



Source: Assessment of the Social Innovation Incubator survey



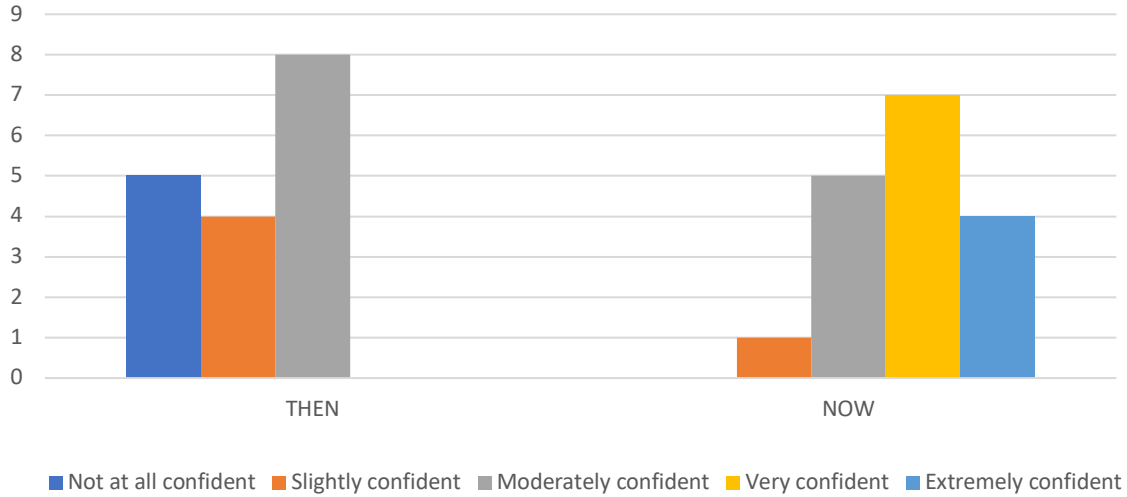
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13. I am able to design new ways and tools for communities to recognise signs of sleep apnea and seek medical help.

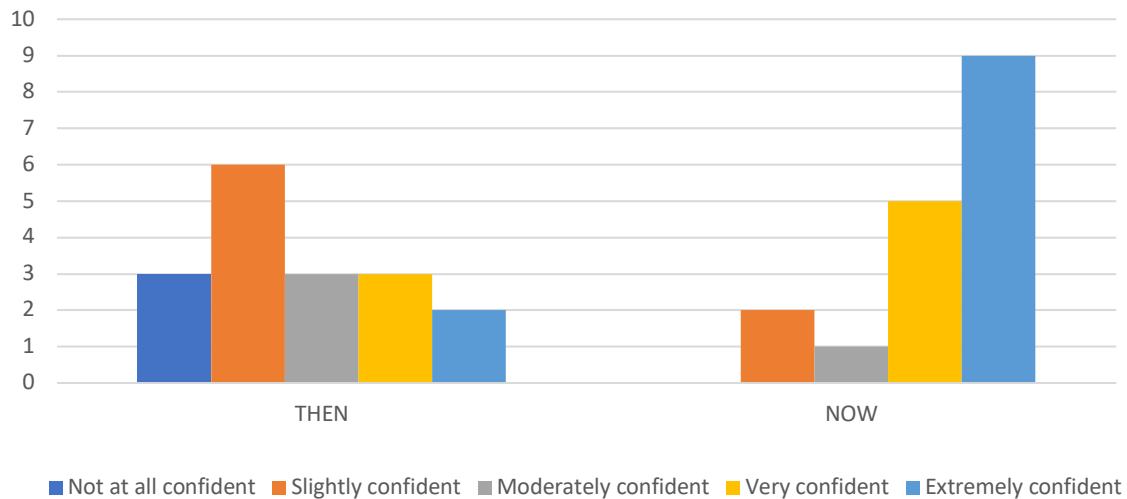
THEN score 37  
NOW score 65



Source: Assessment of the Social Innovation Incubator survey

14. I understand how small social innovations can greatly improve the lives of older people.

THEN score 46  
NOW score 72



Source: Assessment of the Social Innovation Incubator survey

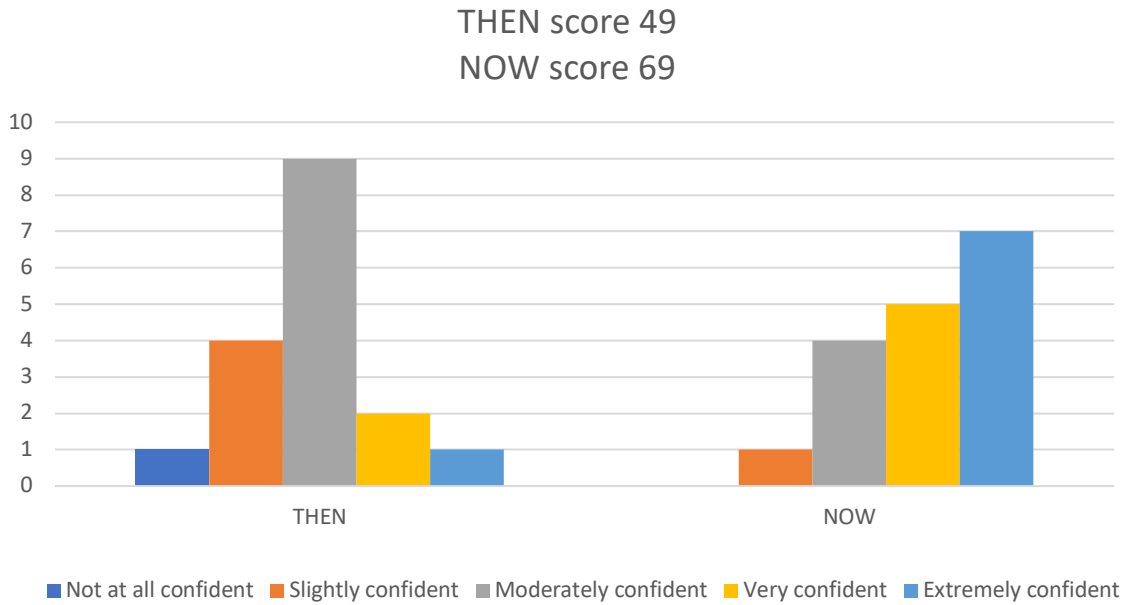


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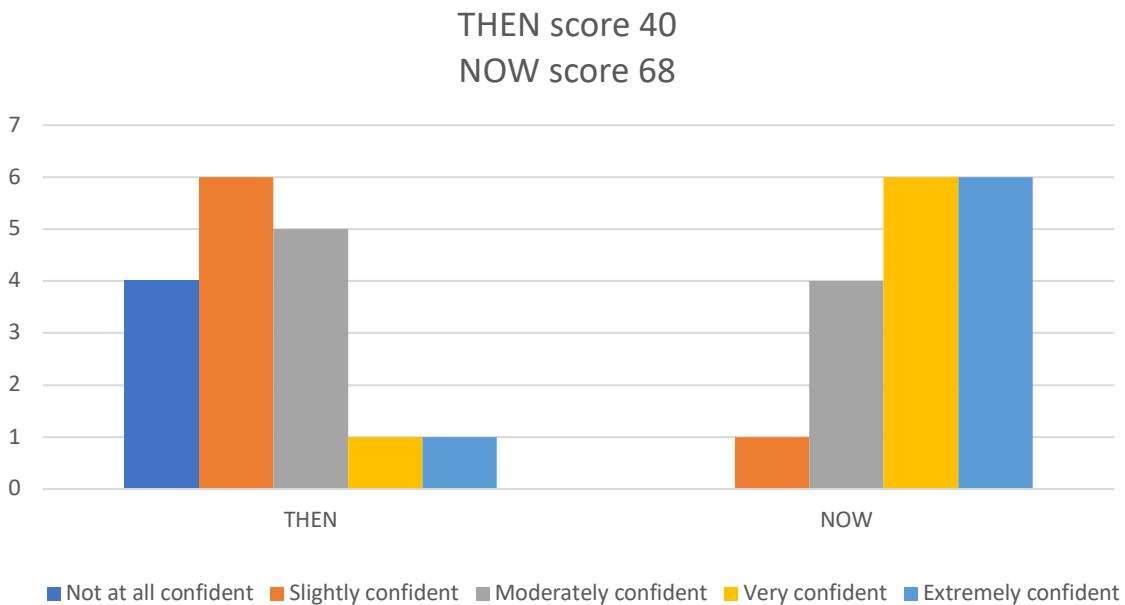
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15. I can recognize **digital challenges faced by older adults** when adopting health technologies.



Source: Assessment of the Social Innovation Incubator survey

16. I can design solutions that are **inclusive and accessible** for older adults with different digital skills.



Source: Assessment of the Social Innovation Incubator survey

## 4.2. Section B: Reflection question

### 1. What was the most important change in how you now approach health and social challenges compared to before the sprint?

The reflections reveal a clear and meaningful transformation in how participants now approach health and social challenges compared to before the Learning Expedition. Many students emphasized that they had shifted from being passive followers of established guidelines to becoming active problem-solvers capable of thinking critically and creatively about real-world issues. Several noted that they had learned to apply structured, systematic approaches rather than relying solely on spontaneous brainstorming, understanding the value of transparent processes for developing and testing ideas.

A recurring theme was the emergence of a human-centred mindset – participants described learning to listen carefully to patients, to observe small but meaningful details, and to appreciate how empathy and dialogue reveal the true nature of health challenges. Exposure to real patients and interprofessional teamwork helped them understand the social and emotional dimensions of care, especially for older adults living with sleep disorders.

Students also highlighted increased awareness of accessibility, inclusiveness, and cross-cultural differences, recognizing that effective solutions must account for diverse needs across populations and countries. Finally, many participants mentioned a growing interest in digital and technology-based solutions, particularly those that make healthcare more user-friendly and equitable. Overall, the reflections show a shift toward systems thinking, inclusivity, and practical application, demonstrating the profound learning impact of the social innovation incubator model.

### 2. Which activity or moment during the sprint contributed most to your learning (e.g., expert interviews, Crazy 8s, prototyping, pitching, community challenge on sleep apnea)? Why?

Participants' reflections on the activities that contributed most to their learning highlight a rich combination of hands-on creativity, expert input, and real-world interaction. Many students identified the expert and patient interviews as the most impactful experiences, as they provided direct access to professional insights and authentic human stories. Engaging with experts in sleep medicine and listening to patients' personal struggles helped students translate theoretical understanding into empathetic, context-aware learning, grounding their ideas in real needs rather than assumptions.



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Several participants emphasized the Crazy 8s and brainstorming sessions, appreciating the collective energy, creativity, and collaborative momentum these activities generated. They described how structured ideation helped them narrow down and refine their ideas systematically, demonstrating how group diversity fosters innovation.

The pitching sessions emerged as another pivotal learning moment, often described as challenging but highly rewarding. For many, it was their first experience presenting an idea in a competitive, high-impact format, learning to communicate complex concepts clearly, persuasively, and within time limits. Others pointed to prototyping and the community challenge as key moments that transformed abstract ideas into tangible, testable solutions.

### **3. How likely are you to apply sprint/design thinking methods in your future studies, professional practice, or community projects?**

The responses show a strong and consistent appreciation for the practical value and transferability of the sprint and design thinking methods. The majority of participants indicated that they are likely or very likely to apply these approaches in their future studies, professional practice, or community projects. This demonstrates that the Learning Expedition not only enhanced their understanding of sleep health and social innovation but also equipped them with a concrete methodological framework they can confidently reuse in diverse contexts.

#### **4.3. Section C: Short essay**

Please describe your experiences, approximately 700 words. Specifically, in your own words, explain what happened, including the time, place, individuals involved, events, and objectives. Moreover, reflect on the emotional impact of these events (how they made you feel) and the knowledge gained from these experiences, providing specific examples. Identify areas of success and areas for improvement, and suggest potential enhancements. Additionally, describe which of the acquired skills and knowledge can be effectively applied to your future practice, and why. If applicable, also outline any additional skills and knowledge that would be beneficial to you for further improving your understanding of sleep medicine. Finally, express your willingness or not to continue your involvement with your group and outline any steps that you may take to maintain your participation/involvement/contact with them.

Example answers:

1. *I found out about this project through a friend of mine who was already in a project. I decided to join since this was my last uni year and I wanted to give a try to something new and unique. After completing an online sessions, we started the project in Heraklion Crete, this July. It was overall a nice experience, where i had a chance to work in an international team. I might have learnt something about sleep medicine, OSA, CPAP, health systems in Greece and Iceland, but I've learnt about myself the most. I realized that i can work under not-ideal, new, unknown circumstances, that i can manage and find a similar language within a team even though not everyone is as-capabile and as-easy-to-manage. It was cool to think in this innovative way, to try to think of something new, never-seen-before. However, i think the main issue with a project is a lack of diversity among students - most of us were medical students. I think it would be better and the idea would have been more realistic if a team consisted of a medical student, a business school student and an IT student. That way we would have experience and insight from all 3 worlds: medicine, business and technology, which was basically the theme of a project. Since we were all just healthcare-related studies, at the end there is no realistic and finished project to offer. It was a cool experience overall and I'm incredibly grateful for this opportunity, but personally, I do not see myself spending any time further developing any digital tools for OSA, or anything else really. I'm leaving that to some other minds, as mine is "made" for clinical work. However, I'm fully supporting further projects like this, and giving this opportunity to other students.*

2. *This program gave me a mix of entrepreneurship and medicine, spread across four days in Crete in July and five days in Split this week. In Crete, our task was to design and pitch a prototype sleep app. Even though the idea was hypothetical, the process of brainstorming, working in teams, and presenting under pressure felt real. It pushed me to think creatively while also being mindful of practical challenges. In Split, we shifted toward developing a project to raise awareness about sleep health, with a special focus on obstructive sleep apnea (OSA). Meeting patients who shared their experiences was one of the most impactful parts. Their stories grounded our ideas in reality and reminded me that behind every "concept" is a person whose daily life is affected. Testing our project ideas with them was both challenging and motivating. It zshowed us what resonated and what needed improvement. I felt proud of contributing ideas that connected science to practical solutions, though I could improve by asking more critical questions during the design stage. The program strengthened my teamwork, communication, and problem-solving skills—abilities I hope to carry into future projects. I'd be glad to stay connected with the group and continue building on this momentum. Finally, although at first I was disappointed because I thought it would be more about medicine rather than entrepreneurship it turned out to be an experience that otherwise I would not have and in spite of the fact that I study medicine I feel like the skills I obtained through the program will be useful in my career and life in general.*



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3. The eSleep\_dHealth programme was an inspiring journey that combined teamwork, innovation, and cultural exchange. It gave me the chance to collaborate with people from across Europe, learning about sleep medicine and the need for digital literacy. In July, we met in Heraklion for an intensive workshop. Over several days, we worked in international teams to brainstorm solutions for real-world challenges in sleep medicine. A highlight was speaking directly with sleep experts and interviewing patients. Their perspectives grounded our discussions and reminded us that digital tools must meet the needs of those who actually use them. In September, we reunited in Split, where the focus shifted to entrepreneurship and pitching. After refining our concepts over the summer, we presented them to mentors and peers. Pitching in such an international setting pushed me out of my comfort zone, but it also boosted my confidence. I learned how to clearly communicate ideas, respond to feedback, and think about sustainability and impact. I felt energized by the creativity of my peers and grateful to learn from pioneering experts. From this experience, I gained skills in intercultural communication, rapid innovation, patient-centered design, and entrepreneurship. These are tools I can carry into my future practice, where teamwork and digital literacy will be increasingly important. Most importantly, I wish to stay connected with my group, as the relationships formed through these two learning expeditions are among its greatest achievements.

4. I participated in First and Second Learning Expedition where I was placed in a group with international colleagues. We were challenged to find solutions for two different problems. This motivated us to think about users and their needs and broaden our thinking so that we create something that is actually needed and convenient to use by our target group. It was hard to collaborate but in the end we developed great communication and task distribution and are all very happy with final product. It all helped me learning how to work in a team and developing my user centered approach as well as business ideas and presenting them. We discussed that maybe we could continue our story and product because we strongly believe it would be useful for our society.

5. During these approximately 2 weeks, my group was together a lot, we spent time learning new things and getting to know each other. It was very valuable to me to get to know how to work in teams, I think I was a good team member. I think working in teams was very good, but I am very sorry that we did not have more students from the IT sector since the original idea was to make an app. I think that in the future more people from the IT sector should be included. I learned a lot about sleep medicine and I really liked interviews with patients because I found out how important and common is, for example, sleep apnea and what it means for patients. I hope that me and my team will stay in touch and I am sure that we will do via texting and WhatsApp but I also hope that we will see each other in the future and have an opportunity to work together again.



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## 5. Set of Recommendations from Student Essays

Based on the students' reflective essays, following recommendations can be put forward to enhance future Learning Expeditions and similar social innovation incubators in health and education:

### 1. Increase Interdisciplinary Diversity

Students consistently emphasised the need for **broader representation across disciplines**. While most participants came from medical backgrounds, many recommended including **IT, engineering, and business students** to bring in technological expertise, entrepreneurial thinking, and implementation perspectives. Mixed teams would mirror real-world innovation ecosystems, making the proposed digital solutions more feasible and sustainable.

### 2. Strengthen the Connection Between Medicine and Entrepreneurship

Participants valued learning about entrepreneurship but initially expected a stronger medical focus. They suggested framing the programme more clearly as an **intersection of healthcare, innovation, and entrepreneurship**, showing how business and design tools can directly enhance patient care and system efficiency. This would help medical students better appreciate the relevance of innovation skills to their future practice.

### 3. Enhance Real-Life Engagement

The **interviews with patients and experts** were described as the most impactful activities. Students recommended maintaining or expanding these interactions to ensure that projects remain grounded in real needs. Future programmes could include **more structured opportunities for fieldwork, user testing, and stakeholder feedback**, as these foster empathy, motivation, and authentic learning.

### 4. Foster Long-Term Collaboration and Mentorship

Participants expressed a desire to **stay connected** with their teams and mentors after the Learning Expeditions. Establishing **online follow-up sessions or mentorship networks** could help students further develop their ideas, explore entrepreneurship pathways, and maintain cross-border collaboration beyond the project duration.

### 5. Support Team Dynamics and Communication Skills

Working in multicultural and multidisciplinary teams was challenging yet rewarding. Students suggested including **more guided activities on teamwork, communication, and task distribution**, particularly early in the process. These would help teams form more efficiently and reduce initial uncertainty or imbalance in workload.



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## 6. Provide More Technological and Implementation Support

Given that several projects involved app concepts or digital tools, students recommended **stronger integration of IT mentors and prototyping support**. Simple workshops on design software or digital mockup tools could help translate ideas into tangible outputs during the sprint.

## 7. Highlight Personal Growth and Reflective Learning

Many reflections pointed out that the most meaningful learning was **self-discovery** – realizing one's ability to adapt, collaborate, and create under pressure. Future iterations could explicitly incorporate **structured self-reflection moments**, allowing participants to articulate how the experience shapes their professional identity and mindset.

## 8. Encourage Continuation and Real-World Application

Several students expressed a desire to further develop their project ideas, as they recognised their potential for real social value. Future programmes could create pathways for **incubation, mini-grants, or external mentorship** to support promising projects in moving beyond the educational setting.