Synthesis Report

Mapping Platform. Collecting and sharing data on Informal Learning Spaces

Tommaso Empler, Adriana Caldarone, Lauren Ferro

Sapienza University of Rome

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Sommario

List of abbreviations

AKD	Akdeniz University (Antalya, Turkey)
HTW	HTW Berlin - University of Applied Sciences (Berlin, Germany)
ILS	Informal learning spaces
NIILS	New Inclusive Informal learning Spaces
MRU	Mykolas Romeris University (Vilnius, Lithuania)
SAP	Sapienza University of Rome (Rome, Italy)
SWFO	Students with fewer opportunities
UWK	University for Continuing Education Krems (Krems, Austria)
UCD	User Centered Design
WI	Walking Interviews

1. Introduction

This synthesis report, produced by Sapienza University of Rome, provides an overview of the findings of the NIILS project consortium, particularly regarding the development of a "mapping platform" for online mapping of informal learning spaces across the participating universities.

Individual universities prepared national reports, and this document summarizes the data found in those reports. The participating universities are: Akdeniz University (Antalya, Turkey; AKD), HTW Berlin - University of Applied Sciences (Berlin, Germany; HTW), Mykolas Romeris University (Vilnius, Lithuania; MRU), Sapienza University of Rome (Rome, Italy; SAP), and University for Continuing Education Krems (Krems, Austria; UWK).

According to the NIILS project, informal learning spaces (ILS) are environments freely chosen by students to independently develop their learning paths. These spaces, located outside traditional classrooms, foster individual or collaborative learning activities, even outside of class hours. Examples of ILS may include:

- Student lounges and relaxation areas
- University atriums and corridors
- Spaces within libraries
- Cafés and outdoor areas near the university

A key feature of ILS is their flexibility and the possibility of being used in different ways according to the needs of the students.

The platform's aim is to capture the state of the art of informal learning spaces in higher education nationally and internationally and it is to connect and facilitate communication among those interested in using informal spaces, as well as to provide information for stakeholders responsible for their provision, management and design. The platform also allows stakeholders to have an always-updated database of data to plan interventions for any maintenance, redesign, and management of ILS. The mapping platform provides information on both the physical characteristics of the spaces and the users' perceptions of them. Walking interviews were used to collect information needed to describe the spaces. Two factors motivated the use of this method: first, it recognizes that spaces are always the result of the interaction between humans and their environment. Walking interviews allow interviewees to move around and interact with the space they are discussing, thus better highlighting the relationship between spatial dimensions and their own ideas. Second, defining informal educational and teaching spaces requires considering the uniqueness of each person, their identity, and their study or teaching methods in order to provide a more inclusive overview. Walking interviews conducted for this study were structured in two different steps that involved each international partner with students and lecturers. The data collected was then organized and divided by country.

The experiment is based on the premise that the data to be collected pertain to different countries with distinct cultures, climatic environments and exhibit varying characteristics in terms of:

- Campus Size: The extent of the university campus can influence the availability and utilization of informal learning spaces (ILS).
- Population Density: Numbers of students and individuals present within the campus can impact the use of ILS and interpersonal dynamics within them.
- Student and Staff Numbers: Size of the university population can affect the demand and competition for ILS usage.
- Faculties: Different nature of faculties and study programs can lead to different needs and preferences regarding learning spaces.
- Study Programs Offered: Type of courses and teaching activities can influence how students utilize ILS.
- Fields of Study: Academic disciplines may have specific requirements for spaces and equipment, influencing the configuration of ILS.
- Years of Establishment: The age of the university and its history can condition the campus architecture and the availability of ILS.

Understanding these contextual specificities allows for a more comprehensive and nuanced analysis of the consistencies and differences emerging from the user-centered analysis regarding the use, perception, and impact of ILS.

2. Methodology

2.1. Design of the Mapping platform

The development of the mapping platform went through several iterations before the final design was developed and subsequently iterated and used in two rounds of walking interviews.

The mapping platform was built as a WordPress website, which provided a wealth of possibilities, including customisation, while also allowing for the incorporation of additional capabilities when user demands, or development ideas occurred. Choosing a website also ensured universal accessibility across devices, transcending OS systems and using minimal information retrieval resources (e.g., bandwidth), all without the requirement for user registration. Its ability to deliver timely updates was critical to the platform's long-term viability.

Similarly, a website's digital structure guarantees easy accessibility, allowing for the exploration and discovery of a wide range of suitable study locations, from libraries and coffee shops to quiet corners. The search parameters of the mapping tool, which can be modified depending on preferences such as noise levels, closeness, and local facilities, produce personalised results. Furthermore, the incorporation of real-time updates is on the horizon, possibly providing students with current, reliable information regarding the ambience, seating availability, and general appeal of each location.

To design the mapping platform, we adopted a user-centered design (UCD) approach. UCD is a critical approach in the development of interactive experiences that require a large amount of input from the user. UCD emphasises the critical relevance of placing the end user at the center of the creative process. This technique recognises that the effectiveness with which a design satisfies the requirements, preferences, and expectations of the people who will engage with it determines its success and adoption. One of the main benefits of a UCD approach is that it can lead towards an improved user experience while also reducing the chance of redundant redesigns and post-launch problems because it engages directly with users early and frequently (as the case with the walking interviews). Furthermore, it helps to stimulate empathy, inventiveness, and a deeper knowledge of the target audience's behaviours and motives.

Furthermore, the use of a user-centered design strategy was a key priority during the development process. Extensive research, including user surveys and interviews, was conducted based on the findings of previous project results to determine which locations students and staff visited or were aware of in terms of informal learning spaces. This data, coupled with past experiences, influenced initial and subsequent iterations of the mapping platform's user-friendly layout, search capabilities, and the addition of filters to tailor search results based on feature preferences within the space. The mapping platform seeks to give an efficient and focused experience by prioritising user requirements, the potential to generate positive user interaction and possibly lead to recurrent usage of the spaces with users being aware of their existence.

When creating the mapping platform, knowing the aims and criteria of what the platform should deliver and how it should be utilised was crucial. Therefore, the walking interviews were meant to achieve this purpose, as well as to establish what and how people would use such a mapping platform, and, more significantly, how to improve on the initial design. Given this, the mapping platform was initially designed based on survey data from earlier stages of the NIILS project, as well as information and design considerations based on previous experiences with comparable systems and was then iterated based on feedback from walking interviews and discussions among project partners.

This approach necessitates the collection of information derived from a quantitative-qualitative analysis that places users, their considerations, and their needs at the forefront. To achieve this, the walking interview method was employed, as described in the subsequent paragraph.

2.2. Walking interviews

Walking interviews emerged within the qualitative research field approximately two decades ago (Kusenbach, 2003), representing an innovative methodological approach to data collection and the exploration of participants' experiences. A walking interview is a method in which the researcher and participant move together within a predetermined context while the interview takes place. Various formats of this type of interview have been outlined in the literature (Anderson, 2004; Carpiano, 2009; Clark & Emmel, 2010; Kusenbach, 2003). Although each of them may present differences in focus, purposes, and objectives, they all share the fundamental principle that the researcher engages in dialogue with the participant while they move together, generally on foot, in a specific location.

During a walking interview, the researcher assumes a dual role: interviewer and observer. While accompanying the participants in their natural environment, the researcher asks open-ended questions, encouraging reflections and descriptions of the activities carried out. Active listening is crucial to capture the nuances of

language and the participant's emotions, while observation allows for the collection of non-verbal data, such as gestures, facial expressions, and body language, which can enrich the understanding of the studied phenomenon.
Similarly to traditional seated interviews, the researcher in a walking interview arrives prepared with a set of guiding questions, aimed at directing the conversation towards specific themes or aspects of the participant's experience. However, the dynamic nature of this method requires flexibility and open-mindedness on the part of the researcher, who must be ready to adapt to the flow of the conversation and seize unexpected insights that emerge during the walk. "Ad hoc" questions can spontaneously arise, stimulated by the researcher's observations or the participant's reactions, further enriching the data collection.
However, given the increasing use of walking interviews, it is of paramount importance to maintain constant monitoring of the literature and carefully weigh the motivations behind their adoption, especially when involving individuals with fewer opportunities. It is indeed plausible that ethical issues may arise and that opportunities may be identified to optimize the technique, in order to guarantee the well-being and safety of participants.

The method is useful for analyzing the physical, mental, and social dimensions of a place over time, offering a longitudinal perspective on individual experience. The interviews made it possible to understand how an individual interacts with their social and physical environment, highlighting behavior in daily informal study activities.
The participatory walking interview is distinguished by the flexibility of the route, chosen directly by the participant. The purpose of this mode is to allow the researcher to access the attitudes and knowledge of the participants regarding the ILS. The interview aims to provide information on the sense of connection that an individual has with the chosen place, offering a contextualized perspective.
To investigate the participants' perception of the place, walking interviews are particularly useful. While walking, the researcher can observe how the participant interacts with the surrounding environment, which elements attract their attention, and how these elements influence the discourse. The chosen path, whether selected by the researcher or the participant, can reveal preferences and habits related to the lived space (Carpiano, 2009). The walking interview also allows us to explore the sense of belonging to the place and the relationship with the physical and social context.
The use of walking interviews has taken on particular significance in the context of the development of the mapping platform in progress, as the platform required realistic and practical information (i.e., the use of real spaces frequented). Furthermore, understanding the impact and use of these places has been essential to improve the functionality of the platform.

3. Overview of the first round of walking interviews

Each international partner conducted two rounds of walking interviews in different seasons to identify which spaces are most used under different weather conditions and temperatures, including outdoor spaces. The interviews were conducted with both students and lecturers. In both the first and second sessions, a minimum of 8 students and 2 lecturers were interviewed per country, for a total (minimum) of 16 students and 4 lecturers. To ensure that the experiences of different lecturers are represented, participants with different backgrounds, genders, ages, and from different faculties will be included in the walking interviews.
The interviews were conducted in different ILS identified by each project partner and mapped. The map was shown to the students and lecturers, who chose two spaces on the map where they could conduct the interviews, or they chose the first space and the second was chosen by the researcher.
This approach allowed for the collection of data on a wider range of previously identified campus locations.
The questions were divided into:

- Background questions
- Questions about the characteristics of the spaces
- Questions about the usability of the platform

Photographs were taken during the interviews, and then the platform to be developed was shown. Data collected was then organized and uploaded by each project partner into a Google form prepared for data collection from all countries.
Each piece of data was then divided into units of meaning and entered a spreadsheet to create an organized chart that allows for the analysis of the characteristics of each selected space.

3.1. Participant Demographics

The first round of walking interviews included professors, lecturers, and students. Participants (n=54), comprising 38 students and 16 lecturers from the five institutions, came from a variety of departments (e.g., Marketing, Architecture, Building, and Digital Communication).

University	Participant	Number of participants
1 University for Continuing Education Krems (Krems, Austria) (UWK)	Lecturer / Course Director	2
	Student	8
2 HTW Berlin - University of Applied Sciences (Berlin, Germany) (HTW)	Student	8
	Lecturer / (Associate) Professor / Researcher	4
3 Mykolas Romeris University (Vilnius, Lithuania) (MRU)	Student	4
	Associate Professor/Professor	
	Lecturer	2
4 Sapienza University of Rome (Rome, Italy) (SAP)	Student	10
	Associate Professor/Professor	1
	Lecturer	3
5 Akdeniz University (Antalya, Turkey) (AKD)	Student	8
	Associate Professor/Professor	
	Lecturer/ Associate Professor/Researcher	4

Table 1: Overview of participants from the first round of walking interviews

Understanding the composition of the interviewees in terms of gender, age, and habits allows for:

- A better understanding of certain general characteristics of an audience, e.g. age, ethnicity, gender, …

- The identification of the types of content to be developed for the creation of learning communities and guidelines for the development of NIILS, in line with the objectives of Project Result 4 and Project Result 5 of the NIILS Project

Students with fewer opportunities were also considered, categorized into:

- Geographical barriers
- Language barriers
- Economic barriers
- Physical impairments

It is important to note that most lecturers, across all nations analyzed (excluding data collected from UWK), do not use spaces for informal learning outside of laboratories, which can be considered spaces for classical learning.
Below are some summary tables of the demographic analysis applied to the student participants in the interviews from all countries.

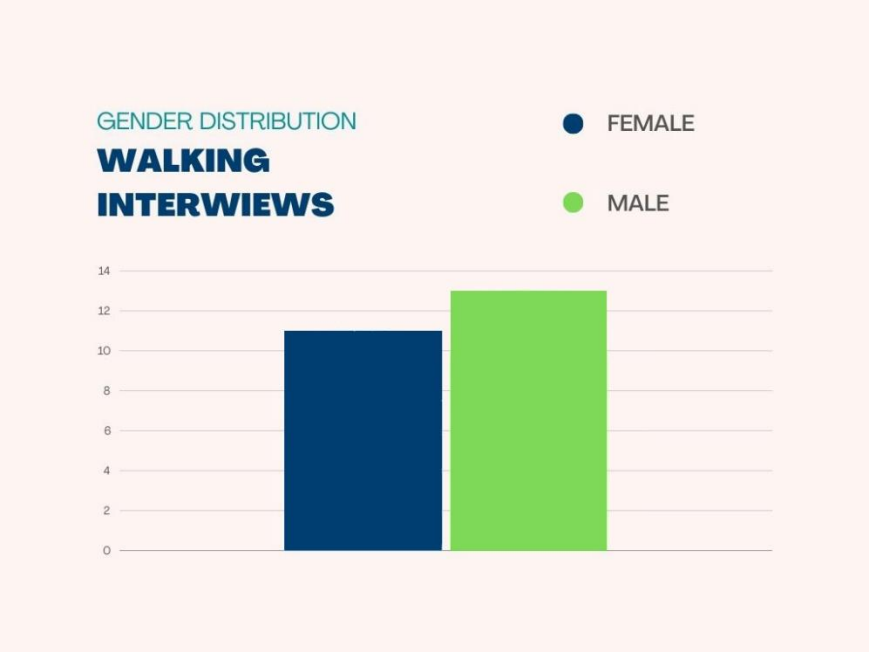

Figure 1: Students gender Distribution of Walking Interview 1 Participants (n = 38).

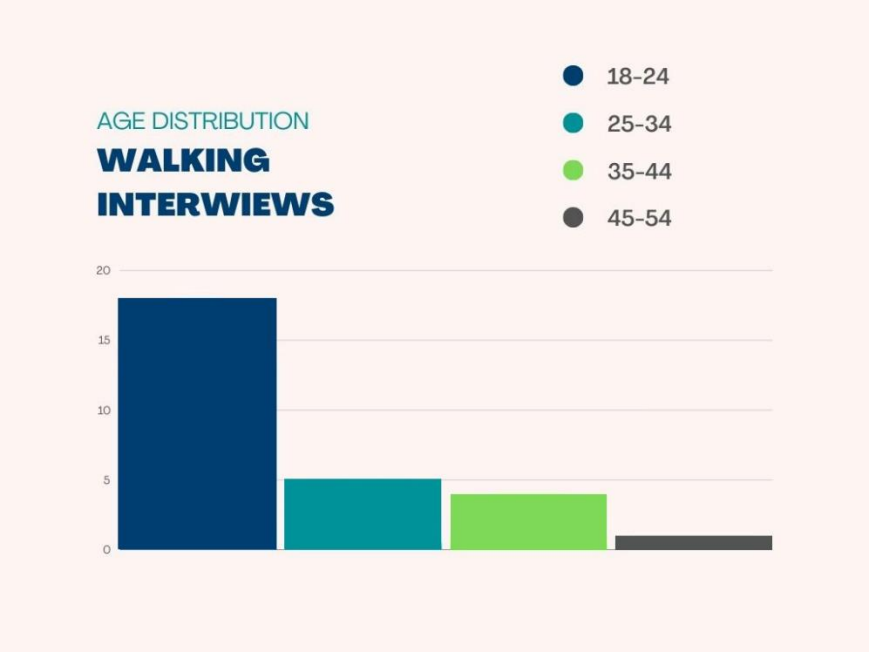

Figure 2: Students age Distribution of Walking Interview 1 Participants (n = 38).

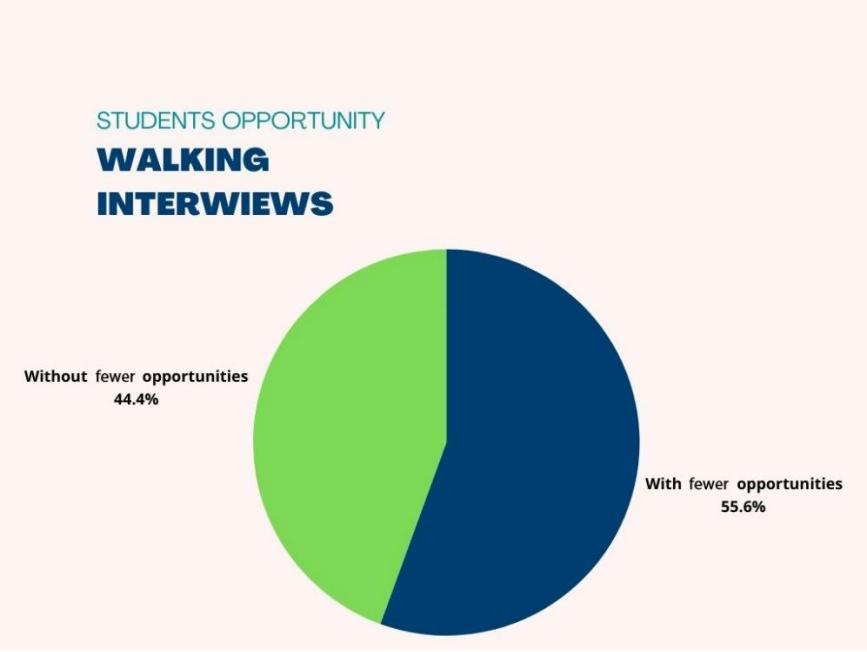

Figure 3: Students who identify themselves as having fewer opportunities in walking interviews 1 (n= 38).

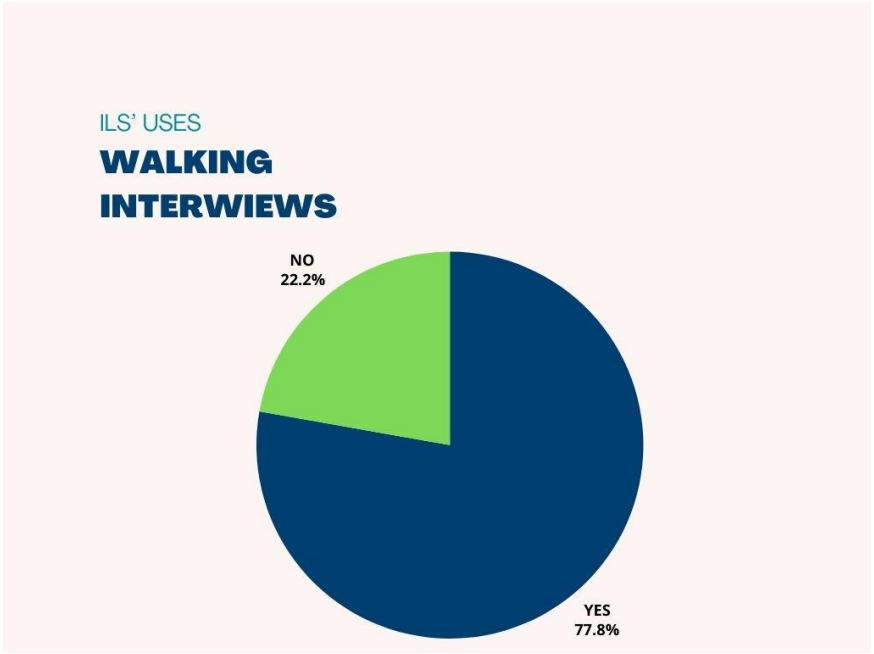

Figure 4: Students who use informal learning spaces in walking interview1 (n= 38).

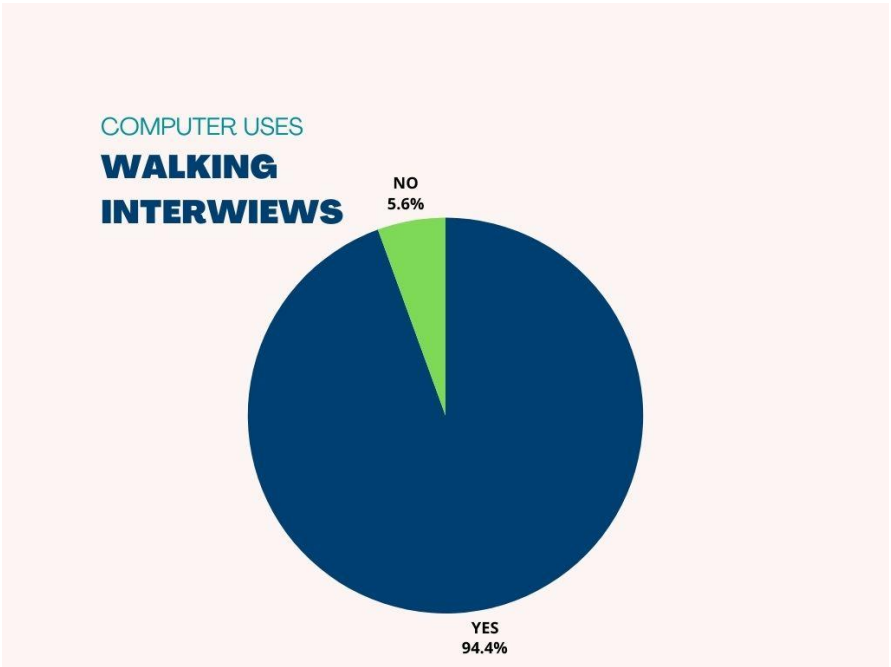

Figure 5: Students who use computer in walking interview 1 (n= 38).

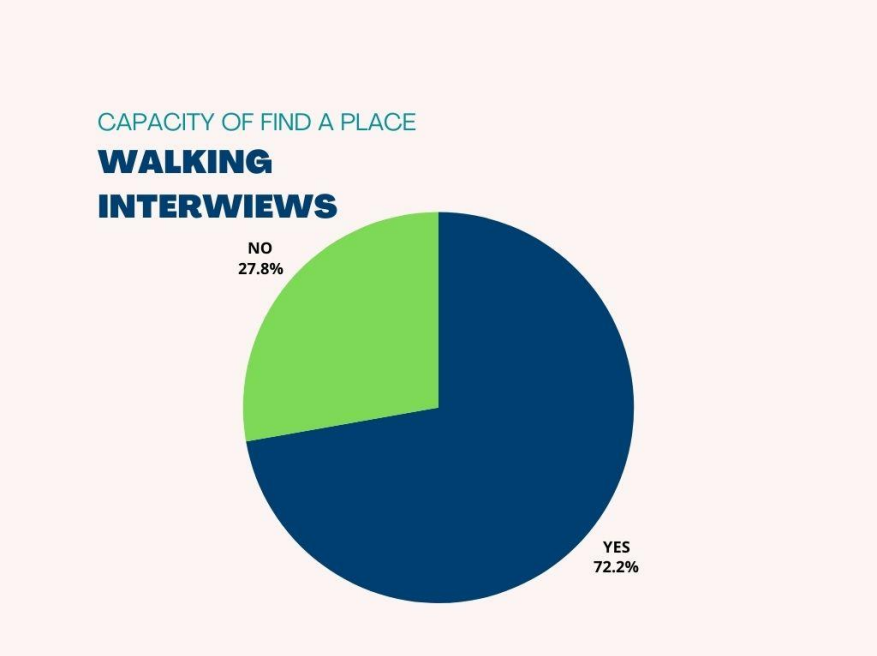

Figure 6: Students feedback on being able to find a place to study on campus in walking interview 1 (n=38).

The sample of interviewees was found to be very diverse, such that it can be considered representative of a wide range of students, making it an appropriate element on which to base considerations.

3.2. Locations

3.2.1. Classification of locations

Interviews conducted in this research took place in informal learning spaces (ILS) identified by project partners and mapped for a comprehensive view. The map was presented to participating students and lecturers, inviting them to select two ILS for the interviews. In some cases, the first ILS was chosen by the participants, while the second was selected by the researcher to ensure greater diversity of contexts.
This methodological approach offered several advantages:

- Broad coverage of ILS: The mapping and selection of ILS by participants allowed for the collection of data on a wider range of informal learning contexts than a predefined approach.

- Flexibility and adaptability: The ability to choose ILS provided flexibility and adaptability to the data collection process, allowing for more effective exploration of the preferences and experiences of students and lectures in different learning contexts.

- User validation: The involvement of students and lectures in the selection of ILS helped to validate the data collected, ensuring greater representativeness of the informal learning contexts used.

The choice of ILS by the participants may have been influenced by individual factors, such as their own preferences and study habits.
The diversity of ILS selected may reflect the variety of informal learning contexts available on campus.
Analysis of the data collected will allow a deeper understanding of the characteristics and functions of ILS in relation to the learning needs of students and lecturers.
The locations can be divided into belonging or not belonging to the campus (or university or faculty building).
Among those belonging to the campus, the partners have mostly identified both indoor and outdoor spaces, divided into:

- Library
- Dormitory (study hall)
- Café
- Faculties Foyer
- Corridors
- Seminar Room
- Canteen
- Outdoors: (green areas, canteen outside areas, sitting areas within campus buildings, etc.).
- Among those not belonging to the campus, the identified spaces can be divided into public spaces (parks or beaches), private spaces (home), privately-owned public spaces (cafés, co-working rooms, multifunctional spaces).

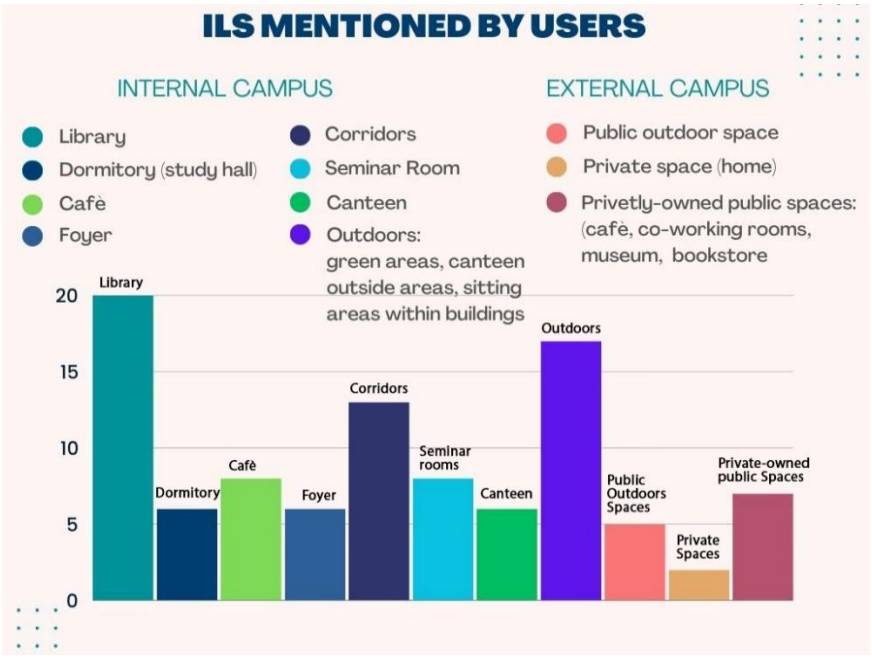

Figure 7: Types of informal learning spaces and number of mentions in on-campus walking interview 1.
ILS are divided into belonging (internal) and not belonging (external) to the campus and differentiated by color tone.

The selection of different spaces may have been influenced by several factors:

- Greater privacy for focused learning
- More space for collaborative learning.
- Amenities, such as the presence of water and snack dispensers, the possibility of eating food inside, comfortable seating and an adequate number of plugs.
- Comfort, such as proper lighting, noise protection and adequate temperature.
- Simplified access, without the need for permits or limited hours.
- Season in which the interviews were conducted.

3.2.2. Typologies and pictures of locations

The following are the types, names, and some images of the locations chosen for each country, in relation to the university campus (or faculty or faculty building).

3.2.2.1. University for Continuing Education Krems (Krems, Austria) (UWK)

Location	Translated Name
Vorraum im 3. Stock, Trakt C (ILS1)*	Anteroom Tract C (3rd Floor)
Foyer im 2. Stock, Trakt C (ILS2)*+	Foyer Tract C (2nd Floor)
ÖH Lounge (ILS3)*+	ÖH Lounge
Bibliothek Leseraum (ILS4)*	Library Reading Room
Akustik-Koje Campus West (ILS5)*	Acoustic Booths Campus West
ARTE Hotel1 (ILS6)*	ARTE Hotel Bar
Cabinet im 3. Stock, Trakt J2 (ILS7)*+	Cabinet Tract J (3rd Floor)

Figure 8: ÖH Lounge

Figure 9: Acoustic booths campus West

Figure 10: Library reading room

3.2.2.2. HTW Berlin - University of Applied Sciences (Berlin, Germany) (HTW)

Location	Name
Library (individual workstations/reading room)	Bibliothek (Einzelarbeits-plätze/Lesesaal)
Seating area at the beach on the river	Strandkörbe am Fluss (Spree)
Hallway seating areas	Sitzgelegenheiten in den Fluren
Seminar rooms	Groupwork, project work, preparations for lectures
Villa Rathenau, rooms for group work	Villa Rathenau, Gruppenar-beitsräume
Lounge	(Tres)Lounge
Cafeteria	Cafeteria

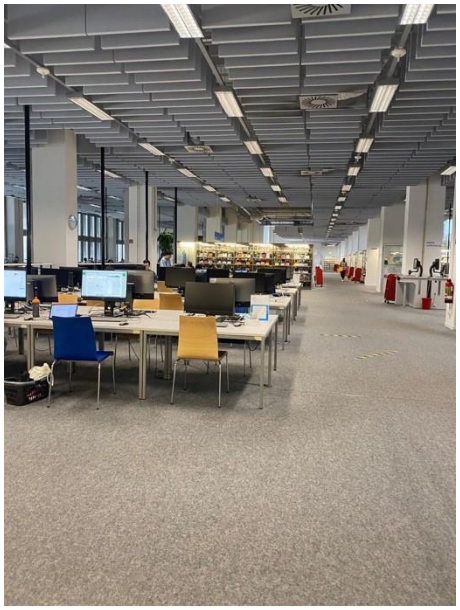

Figure 11: Library (individual workstations/reading room)

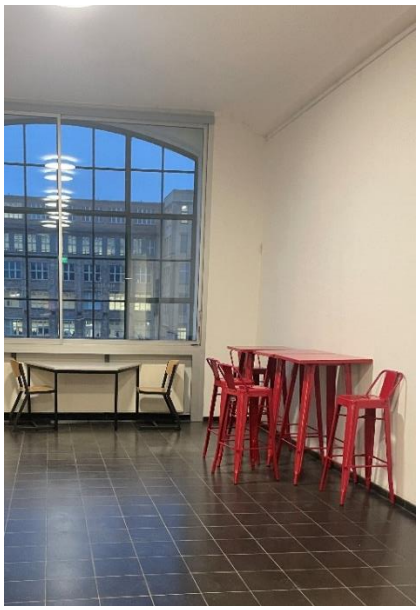

Figure 12: Hallway seating areas

Figure 13: Seating area at the beach on the river

Figure 14: Seminar rooms

Figure 15: Villa Rathenau, rooms for group work

Figure 16: Lounge

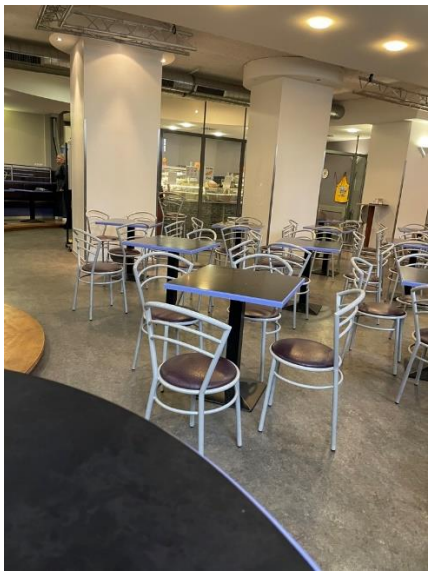

Figure 17: Cafeteria

3.2.2.3. Mykolas Romeris University (Vilnius, Lithuania) (MRU)

Location	Name
Main Library	Biblioteka
Study hall in dormitory	Bendrabučio mokymosi erdvė
Hall at the university	Mokymosi vietos universitete koridoriuose

Figure 18: Main Library

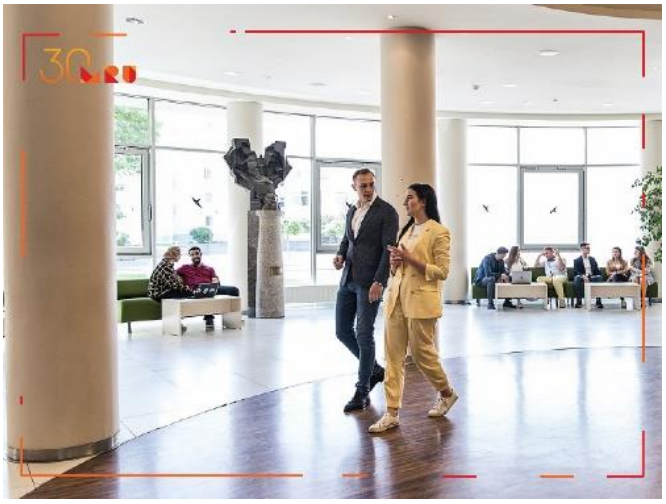

Figure 19: Hall at the university

3.2.2.4. Sapienza University of Rome (Rome, Italy) (SAP)

Location	Name
Main Library	Biblioteca
Faculty of Architecture corridors	Valle Giulia Corridoi
Faculty of Architecture Foyer	Piazza Fontanella Borghese main entrance
Faculty of Architecture study room	Piazza Fontanella Borghese Aula 3
Faculty of Architecture study room	Via Flaminia Aula studio
Faculty of Architecture outside study room	Via Fortuny spazi aperti
Faculty of Architecture outside garden	Valle Giulia giardino

Figure 20: Biblioteca

Figure 21: Valle Gulia Corridors

Figure 22: Piazza Fontanella Borghese main entrance

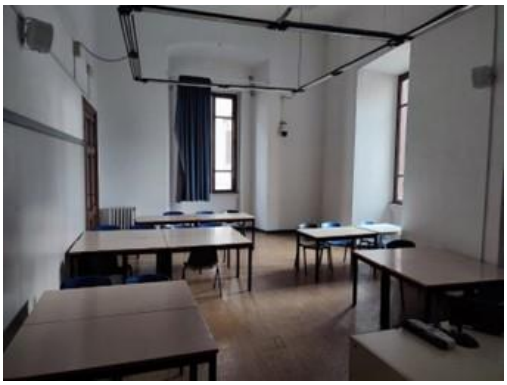

Figure 23: Piazza Fontanella Borghese Aula 3

Figure 24: Valle Giulia giardino

Figure 25: Via Fortuny spazi aperti

Figure 26: Via Flaminia aula studio

3.2.2.5. Akdeniz University (Antalya, Turkey) (AKD)

Location	**Translated Name**
Main Library	Merkezi Kütüphane
Bezmialem Students Dormitory Study Hall	Bezmialem Öğrenci Yurdu Çalışma Salonu
Faculty of Tourism Foyer & Reading Room	Turizm Fakültesi Fuayesi ve Okuma Salonu
Ceypark	Ceypark
Faculty of Medicine Study Room	Tıp Fakültesi Okuma Salonu
Faculty of Engineering Canteen	Mühendislik Fakültesi Kantini
Faculty of Economics Study Room	İktisadi İdari Bilimler Fakültesi Çalışma Salonu
Faculty of Engineering Study Room	Mühendislik Fakültesi Çalışma Salonu
Faculty of Applied Sciences Canteen	Uygulamalı Bilimler Fakültesi Kantini
Faculty of Literature Canteen Outdoor Space	Edebiyat Fakültesi Kantini Açık Alan
Özgecan Aslan Youth Office	Özgecan Aslan Gençlik Ofisi

Figure 27: *Faculty of Medicine Study Room*

Figure 28: Faculty of Horticulture Canteen

Figure 29: Main Library

3.2.3. Characteristics and perceptions of locations

The perception of spaces, or the way in which students and lecturers perceive and interpret them, plays a fundamental role and influences learning and study processes. The impact that a place has on users can indeed affect motivation, concentration, creativity, and well-being.
Factors that influence the perception of spaces can be divided into physical characteristics, accessibility, functionality, and aesthetics:

- Physical characteristics: Lighting, acoustics, temperature, and furniture ergonomics are just a few of the physical elements that can influence the perception of an environment. A well-lit, quiet, and comfortable environment promotes concentration and learning, while a dark, noisy, or uncomfortable space can be disorienting and demotivating.

- Accessibility: Accessibility of learning spaces is not limited to simply removing architectural barriers but embraces a broader and deeper concept that aims to ensure inclusion and free access for all students, regardless of their physical, sensory, cognitive, or other abilities. However, accessibility also refers to the freedom that students are given to occupy spaces without time limits or restrictive rules.

- Functionality: The layout of spaces and their functionality influence the way students use them. Having dedicated areas for focus learning, collaborative learning, relaxation, and socialization is important for creating a flexible and stimulating learning environment. Technological equipment also has its impact: adequate and up-to-date technological equipment, such as computers, tablets, interactive whiteboards, educational software, and fast internet connections, can promote individual and collaborative learning, access to multimedia educational resources, and personalization of learning paths.

- Aesthetics: The aesthetic appearance of an environment can influence students' mood and motivation. A well-kept space, with pleasant colors and stimulating decorations, can create a positive and welcoming atmosphere that promotes learning.

The evaluation of existing informal learning spaces is a crucial aspect for the promotion and dissemination of environments on the platform, to allow a careful choice for future users. In this context, the collection of objective and standardized data is essential for a complete description of these spaces. For these reasons, questions are asked to students and lecturers regarding physical characteristics, accessibility, and functionality. As for the aesthetic characteristics of the spaces, no specific questions have been structured, but free space has been left for users to express their personal opinions and preferences. Small comments or annotations have been collected that will be used to enrich the description of the spaces and provide a more complete perspective of their perception by users.
The questions have been posed in a way to obtain objective parameters and data to be inserted into the platform for the search for informal learning spaces. It is believed that this data will provide a solid basis for the complete description of the spaces and for their evaluation by the platform users. The platform, in fact, can be used to identify the spaces most suited to the specific learning needs of users, considering parameters such as their preferences in terms of physical characteristics, accessibility, functionality, and aesthetics.
The following graphs express, in terms of physical characteristics, accessibility, and functionality, the impressions of the interviewees (students and lecturers).

3.2.3.1. Physical Characteristics

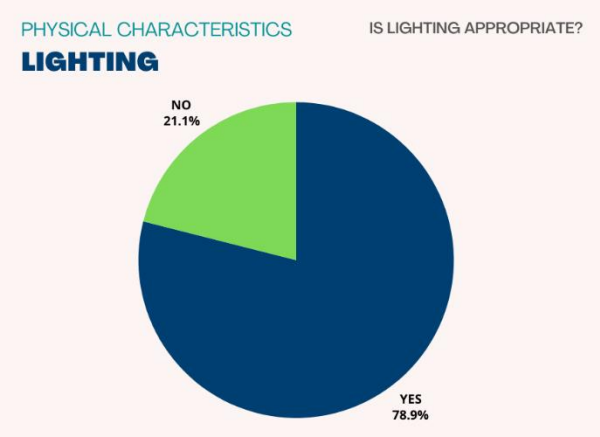

*Figure 30: Spaces with appropriate **lighting** (n= 38).*

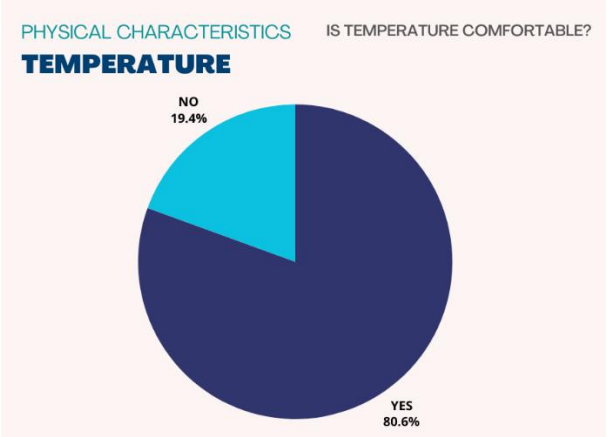

*Figure 31: Spaces with comfortable **temperature** (n= 36).*

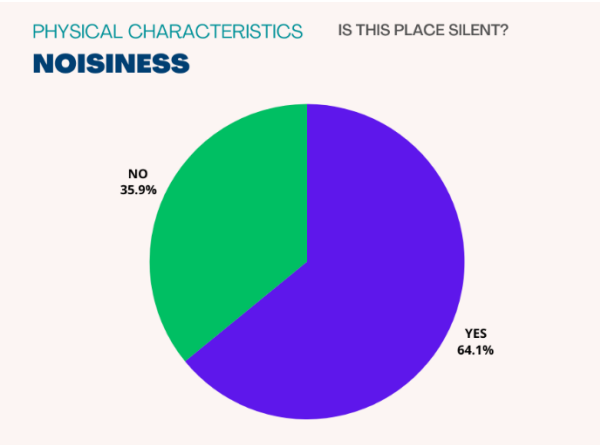

*Figure 32: Spaces with appropriate **acoustics** (n= 38).*

Based on the responses collected and the analyses conducted, informal learning spaces appear to meet the minimum requirements in terms of lighting and temperature. The data indicate that these parameters fall within the ranges considered acceptable for user comfort and well-being.

The data analysis highlights, however, a significant problem related to the acoustics of informal learning spaces. Regardless of the intended use (focus learning or collaborative learning), acoustics seem to be the critical factor that most significantly influences the usability of the environments. This result suggests that acoustics is an often-overlooked aspect in designing informal learning spaces, despite its fundamental role for effective concentration and learning.
The installation of sound-absorbing materials, such as acoustic panels or soundproofing coatings, should be considered an essential component in the creation of new informal learning spaces. These solutions can help reduce background noise and improve user concentration.

3.2.3.2. Accessibility

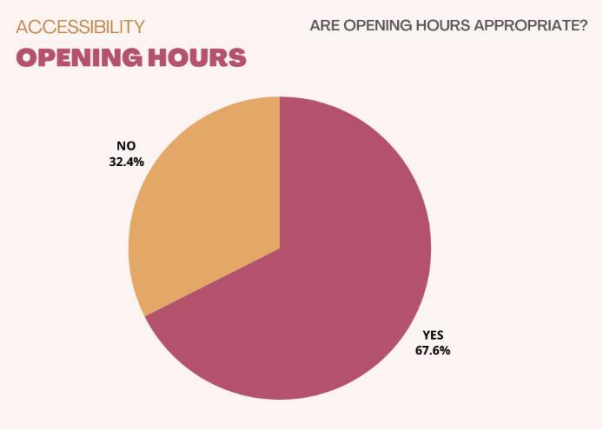

*Figure 33: Accessibility in terms of **opening hours** (n= 37).*

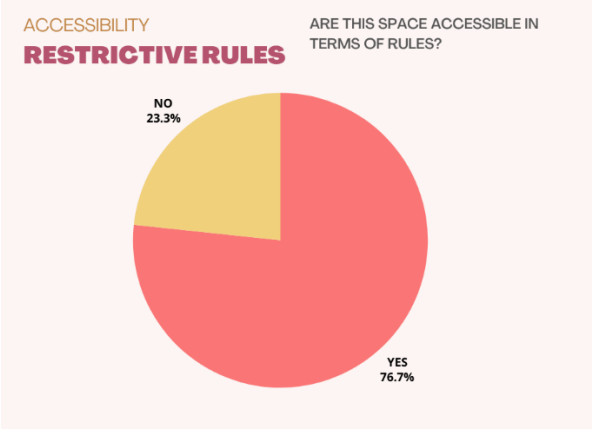

*Figure 34: Accessibility in terms of **restricting rules** (n= 30).*

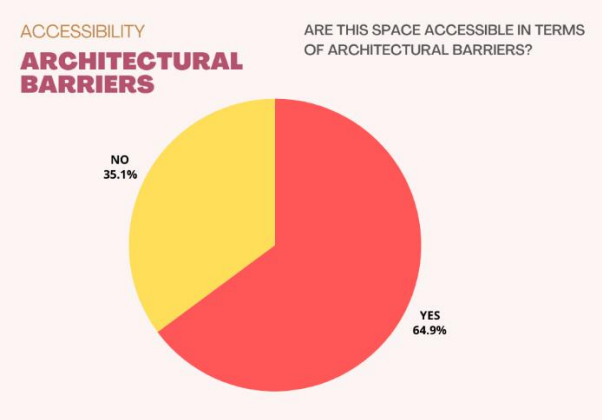

*Figure 35: Accessibility in terms of **architectural barriers** (n= 37).*

Data analysis highlights architectural barriers as the most significant issue in informal learning spaces. Access difficulties are not limited exclusively to the accessibility of the space for people with reduced motor or sensory abilities, but also concern internal accessibility, or the usability of the spaces themselves: the furniture and layout of the spaces often do not allow easy access to relational spaces (i.e. specific areas within a building or public environment that are intentionally designed to promote interaction, socialization, and connection among individuals) or toilets, hindering the mobility and autonomy of users. This situation is particularly critical in contexts characterized by historical architectures, where the design of contemporary learning spaces clashes with pre-existing architectural constraints.
Despite the existence of specific international regulations governing the accessibility of architectural spaces, the reality of informal learning spaces often diverges from these standards. There is a lack of application and compliance with these regulations, with consequent difficulties of access and use for users with disabilities.
It is essential to pay greater attention to accessibility in designing and management of informal learning spaces, particularly in contexts characterized by architectural constraints. Accessibility is not limited to the elimination

of physical barriers, but also includes the creation of inclusive environments that are usable by all users, regardless of their physical or sensory abilities.

In addition to architectural barriers, another problem that emerged consists in the opening hours of informal learning spaces. Opening hours are often incompatible with students' needs, limiting the time available for study and socialization.
In this case, obstacles to be overcome are mainly of an organizational or bureaucratic nature, and therefore more easily overcome than architectural barriers. Furthermore, collaboration with external bodies, such as libraries or student associations, can expand the availability of accessible learning spaces in more extended hours.

3.2.3.3. Functionality

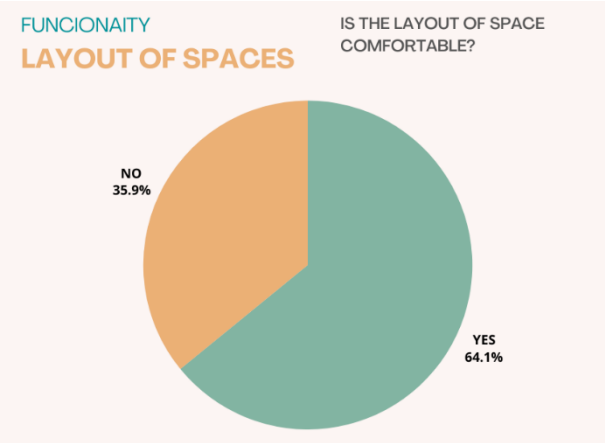

*Figure 36: Space with comfortable **layout of spaces** (n= 38).*

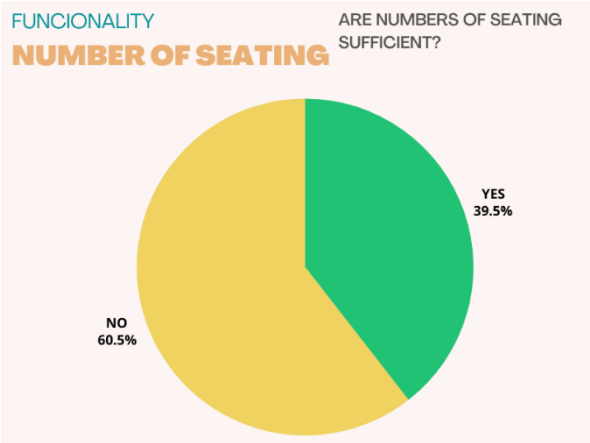

*Figure 37: Space with sufficient **numbers of seating** (n= 38).*

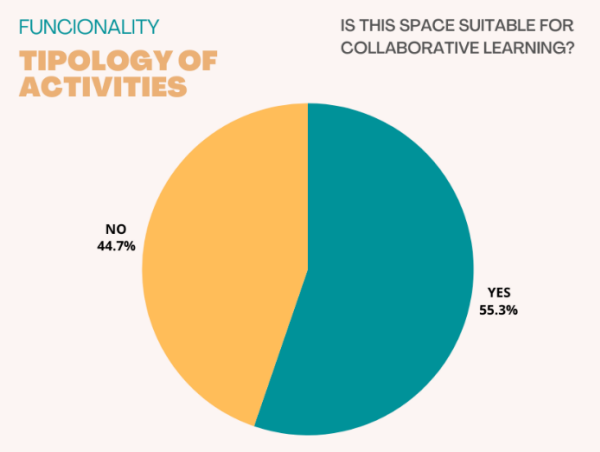

*Figure 38: Space suitable for **collaborating learning** (n= 38).*

The research assessed the functionality of informal learning spaces, considering their comfort in relation to their layout, number of seats, and the type of activities most suitable for them.
The layout of the spaces includes both their physical shape and their "mood" or symbolic meaning. For example, a space with living room-like features can convey a greater sense of comfort and a familiar atmosphere, fostering interpersonal relationships. Conversely, a space designed like a traditional classroom can convey a sense of hierarchy and authority.
Data analysis revealed that informal learning spaces are generally comfortable, albeit with allowance for improvement. However, the percentage of users who rated them as such is not very high.
The most critical aspect that emerged is the lack of seating in informal learning spaces. Universities are experiencing an increase in enrollment and informal learning has become an increasingly widespread practice. Adjusting the number of seats is an urgent need, to which universities often struggle to respond in a timely and adequate manner. This difficulty is particularly evident in older or smaller universities, where limited space is a primary obstacle to expanding informal learning areas.

As for the types of activities most suitable for carrying out within the existing spaces, the factor of focus learning or collaborative learning was analyzed.
Today's study methods have changed, and students increasingly prefer a critical approach that arises from discussion. Collaborative learning, also supported by a simultaneous exchange of information at a distance, is an increasingly popular choice among students of all faculties. However, the available informal learning spaces are often designed for focus learning, where silence is necessary or mandatory.
This analysis highlights the need to rethink informal learning spaces, considering the needs of students and today's learning methods. It is essential to increase the number of seats and reshape the layout of the spaces to favor collaborative learning and focus learning, based on the specific needs of the students and the different teaching activities.

3.3. Use of the mapping platform

Designing an informal learning space (ILS) mapping platform requires the collection of qualitative data that reflects user perceptions and needs. Walking interviews are an effective method for acquiring such data, based on users' direct experience in physical spaces. However, it is essential to have a platform that collects, organizes, and disseminates this data in a user-centered manner, through an interactive mode, focusing on users and their needs.
The data collection platform must pursue the following objectives:

- User-centered design: The platform must be designed to facilitate collection of data that reflects the perspective and needs of users. The user interface must be intuitive and accessible, encouraging users to provide detailed and accurate feedback.

- Efficient data organization: The platform must organize and structure the collected data efficiently, allowing for easy analysis and interpretation. Data must be categorized and coded to facilitate the identification of recurring themes and significant patterns.

- Targeted data dissemination: The platform must facilitate dissemination of collected data to users in a targeted and useful manner. The results of walking interviews should be presented in accessible and easily understandable formats, helping users identify ILSs that suit their specific needs.

Designing effective interactive experiences requires significant user involvement from the very early stages of the creative process. User-centered design (UCD) is a rigorous methodological approach that puts users at the center of development, recognizing the fundamental role of their needs, preferences, and expectations for the success of the final product.
Based on the data collected, an initial prototype of the mapping platform was developed, considering factors such as usability, usage, and accessibility. The prototype was then tested with users during the same walking interviews (both students and lectures) to gather feedback and identify areas for improvement.
Subsequent iterations of the web design incorporated user feedback, refining the platform in terms of functionality, layout, and user interface. The final evaluation involved a larger group of users to confirm the effectiveness and usefulness of the platform.
The adoption of a UCD approach has allowed the development of an informal learning space mapping platform that meets the needs and expectations of users. The platform is intuitive, accessible, and customizable, promoting a positive user experience and frequent use.
The UCD approach is an essential methodology for the design of effective and user-friendly interactive platforms, particularly in the field of informal learning. Involving users from the very early stages of the creative process ensures the development of innovative solutions that meet their real needs, promoting a positive user experience and a significant impact on users.

3.3.1. User’s feedback

To gather feedback, the questions were structured based on the following:

- Usability: Usability refers to the extent to which a system, product, or service can be used by specific users to achieve specific goals effectively, efficiently, and satisfactorily in a specific context of use (ISO

9241-11:2018). In this specific case, it defines the degree of ease and satisfaction with which the interaction between user and the mapping platform's graphical interface takes place, in order to obtain the information sought regarding ILSs.

- Application: This refers to the effectiveness of achieving the goals for which the platform was designed. To evaluate the effectiveness of the ILS mapping platform, it is necessary to define key indicators that measure the achievement of specific objectives. Such indicators may include: Search effectiveness (does the mapping platform allow users to select ILSs based on specific criteria?); Space attendance (does the mapping platform encourage more frequent use of ILSs by users?); Usefulness of information (do users find such information useful and accurate?); Space accessibility (does the platform provide complete and up-to-date information on ILS accessibility, including opening hours, services available, and adaptation for the disabled?);

- Accessibility: This refers to the ability of information and communication technology (ICT) systems to be used by people with disabilities. Accessibility considerations include providing information and user interfaces that can be perceived, understood, and navigated by people with a wide range of abilities, including those with visual, auditory, physical, cognitive, or speech disabilities.

The following presents the feedback results for users from all nations, divided into lecturers and students. Questions asked to receive this feedback were:

- Question 1: Could the web app help you find a place to study?
- Question 2: Is the web app easy to use?
- Question 3: Do you find the search filters included in the platform useful?
- Question 4: Do you like the graphical interface of the web app?
- Question 5: Would you consider using the web app in the future or recommend it to others?
- Question 6: Do you think the platform's technology makes information more accessible and usable for everyone?
- Question 7: Do you think the platform can be useful for students with fewer opportunities?
- Question 8: Is it easy for you to find the spaces or information that suit you best?

It is important to note that Question 2, Question 4, and Question 6 were not asked to 8 students, and Question 8 was not asked to 16 students.

Lecturers were only asked Questions 2, 3, 4, 5, 6, and 7.

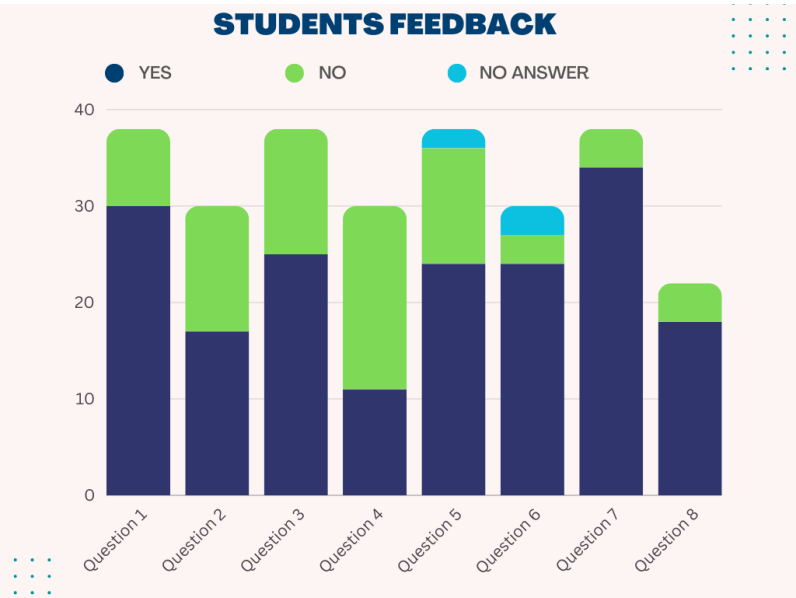

Figure 39: ***Feedback on the features of the Mapping Platform from Student Participants*** *in walking interview 1 (Questions 1,3,5,7, n = 38; Questions 2,4,6, n= 30; Question 8, n=22).*

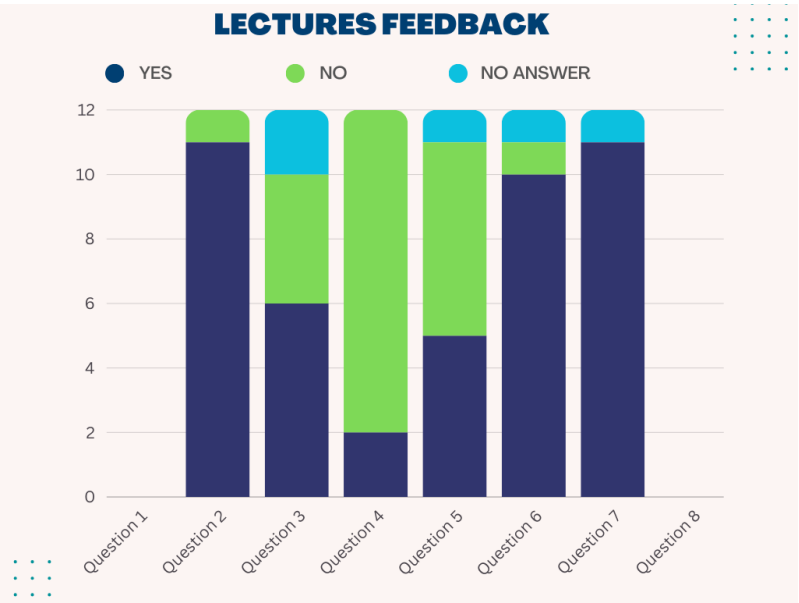

Figure 40: Feedback on the features of the Mapping Platform from Lectures Participants in walking interview 1 (n=12).

A critical analysis of the evaluation data for the informal learning space mapping platform was conducted with the aim of assessing its usability, accessibility, and the effectiveness of its purpose.
As can be seen from the graphs above, students have a negative response to the questions related to the usability and use of the platform (questions 2, 3, 4, and 5). On the contrary, the responses to the questions related to accessibility and inclusion (questions 7-8) were positive.
Interviews with lectures show similar feedback to the students', with a negative response to the questions related to usability of the platform and a positive response to those related to accessibility.
The results of the analysis suggest that the ILS mapping platform is perceived as useful for people with fewer opportunities, both in terms of ease of use and usefulness in finding accessible ILS. However, the platform's graphical appearance was rated negatively and needs improvement. In addition, the filter insertion criteria need to be improved and implemented to optimize user experience and overall usefulness of the platform.
Data analysis has provided valuable information for improving the ILS mapping platform. The results highlight the need to focus on the graphical appearance, filtering criteria, and overall usability of the platform. Further research should be conducted to better understand user needs and refine the mapping platform to make it an effective and inclusive tool for all.
The study concluded with the exploration of possible future implementations for the informal learning space mapping platform, gathering feedback from students and lectures. The proposed implementations include sharing information between faculties, including faculty members in sharing information, and transforming the platform into a metaverse for hybrid learning.
The possibility of sharing ILS information between different faculties of the university was proposed. This would allow students to access a wider range of learning spaces and make the most of the resources available within the institution.
Another proposed implementation is the inclusion of faculty members in sharing ILS information. Faculty could provide reviews and ratings of learning spaces, offering students a more comprehensive perspective.
Finally, transforming the platform into a metaverse for hybrid learning has been proposed as an innovative implementation. A metaverse would allow students to interact with each other and with lectures in a 3D virtual environment, creating a more engaging and interactive learning experience.
The following are the student responses to the following questions:

- Question 9: Would you like the platform to be shared with students in others faculty?
- Question 10: Would you like the platform to be shared with faculty as well?
- Question 11: Would you like to implement a web-app with a 3D space through which you can meet people (via avatars) and exchange information, chat, and files with them?

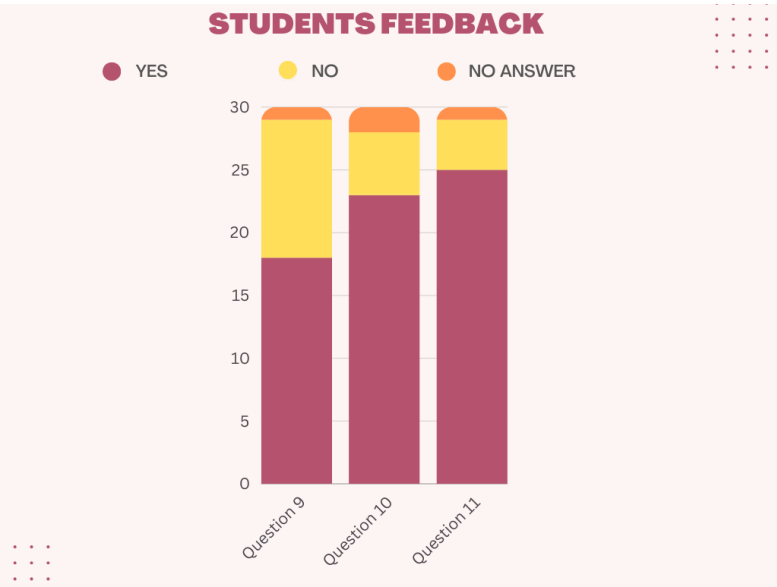

Figure 41: Feedback on the implementation of the Mapping Platform from Students Participants in walking interview 1 (n=30).

The proposed future implementations were met with interest from students, while for lectures there is not enough data to make estimates. Students expressed appreciation for the possibility of accessing ILS information from different faculties and interacting with lecturers and other students in a virtual environment.
Proposed implementations represent an opportunity to expand the functionalities of the ILS mapping platform and to improve the student learning experience. Further research should be conducted to assess the feasibility and effectiveness of these implementations, considering the needs and preferences of users.

3.4. Reporting of comments made by participants during the interviews

The following are additional comments provided during the interviews, regarding both the visited spaces and the mapping platform.

3.4.1. Comments about informal learning spaces

Students want informal learning spaces to have a warm and welcoming atmosphere that feels like home. The furniture should be comfortable. However, according to the students, it does not have to be new and expensive if it is well maintained. For example, comfortable chairs, large armchairs, and the presence of niches that provide hidden areas where they can work in a concentrated way. Tables should be spacious enough to accommodate not only a laptop but also learning materials and multiple users' belongings. Furthermore, there should be access to drinks, e.g. a kettle for tea and maybe some snacks.

- Acoustic Considerations:
  Students stress the importance of good acoustics in the informal learning space, where good speech intelligibility is essential.

- Lighting and Air Quality:
  Good lighting is considered crucial for studying, especially the availability of daylight should be considered. It is suggested that lighting should be sensor-controlled so that one does not have to search for the light switches. In addition, good air quality is mentioned as equally important.

- Flexibility:
  Flexibility was mentioned as crucial for adapting to different learning needs. The ideal learning space should offer the possibility of retreat for individual learning and the possibility to work with a group of, for example, up to six people.

- Availability of Wi-Fi:
  The availability of Wi-Fi in the informal learning spaces is mentioned as crucial.

3.4.2. Comments about mapping platform

As previously mentioned, the main comments regarding the platform were negative in terms of usability. However, students expressed a willingness to improve the platform and provided some suggestions, which are summarized below.

- Easy Access to Information: The mapping platform should provide immediate and intuitive access to essential information, including: an interactive campus map with directions to accessible routes, adapted restrooms, available aids, and other points of interest, complete and up-to-date information on opening hours, seat availability, space accessibility, and available support services.

- Multilingual and Cultural Inclusivity: To overcome language barriers and promote social integration, the platform should offer a multilingual interface with automatic translation options for text and multimedia content, information, and services available in multiple languages and cultural formats.

Students provided further suggestions for enhancing the platform, including:

- Constant Information Updates: Ensure all information is accurate, up-to-date, and real-time.
- Inclusion of Opening Hours: Include the opening hours of all accessible services, classrooms, and offices.
- Advanced Search Filters: Allow users to filter search results based on specific parameters, such as the number of available seats, thermal comfort, and space type (for collaboration or individual work).
- Thermal Comfort Information: Indicate the temperature, humidity, and ventilation of indoor spaces.
- Distinction between collaborative and focus learning: Facilitate the search for spaces suitable for different study needs.
- Integration of an Interactive Map: Enable users to view the campus intuitively and plan their routes.
- Free User Comment Box: Provide a communication channel to gather feedback and suggestions from users.
- Booking System: Implement a booking system for accessible services, classrooms, and spaces.

Implementing these improvement proposals based on student feedback will contribute to making the platform more accessible, inclusive, and user-friendly. Careful usability evaluation and active involvement of users with disabilities in the platform development process are essential elements to ensure a positive and inclusive digital experience for all.

4. Overview of the second round of walking interviews

To further analyze the use of university spaces and gather feedback on the platform's improvements, a second round of walking interviews was conducted.
Objectives of the Second Round of Walking Interviews:

- Expand the Data Pool: Collect data from a larger sample of students and faculty to gain a more diverse perspective on the use of university spaces.
- Assess Seasonal Usage: Investigate whether certain university spaces are more heavily used during specific seasons, identifying any usage trends and patterns.
- Gather Platform Feedback: Obtain user feedback on the platform's improvements to assess their effectiveness and identify further areas for enhancement.

The same methodology was followed as in the first round, already described in Chapter 3, and therefore, it was decided to omit it here, presenting only the results and any comments.
Key findings from the second round of walking interviews are described in the following.

4.1. Participant Demographics

The second round of walking interviews included students' participants (n= 42) from the five institutions came from a variety of departments (e.g., Dentistry, Psychology, Medicine, Law Study etc.).

University	Participant	Number of participants
1 University for Continuing Education Krems (Krems, Austria) (UWK)	Student, Lecturer	8, 4
2 HTW Berlin - University of Applied Sciences (Berlin, Germany) (HTW)	Student, Lecturer	8, 4
3 Mykolas Romeris University (Vilnius, Lithuania) (MRU)	Student, Lecturer	8, 4
4 Sapienza University of Rome (Rome, Italy) (SAP)	Student, Lecturer	8, 7
5 Akdeniz University (Antalya, Turkey) (AKD)	Student, Lecturer	8, 2

Table 2: Overview of participants from the second round of walking interviews

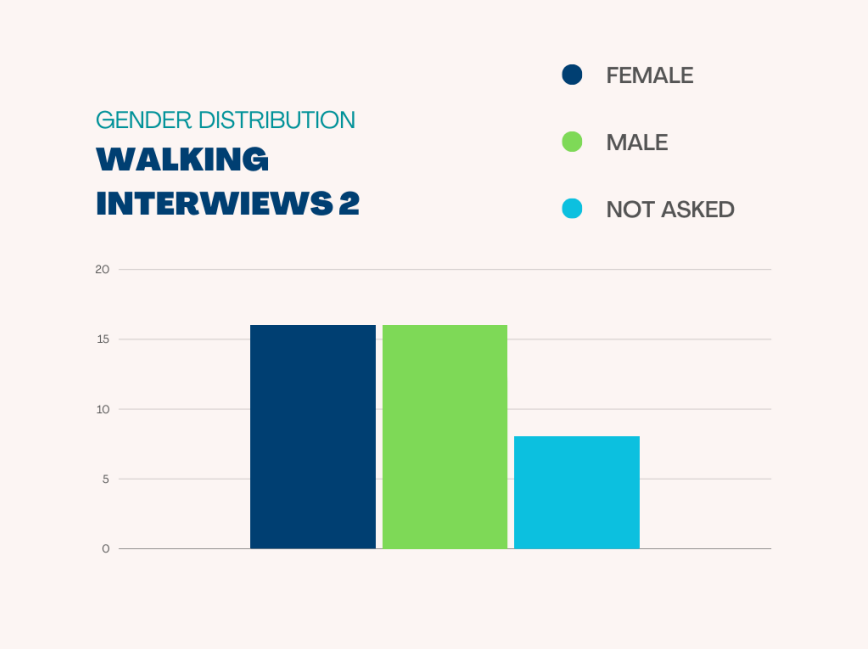

Figure 42: Students gender Distribution of Walking Interview 2 Participants (n =40).

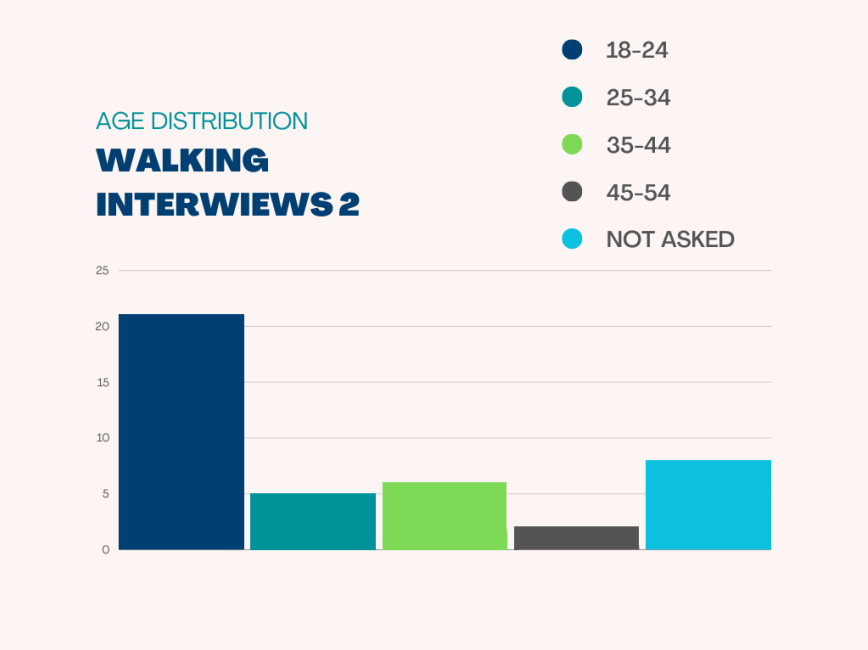

Figure 43: Students age Distribution in Walking Interview 2 Participants (n = 40).

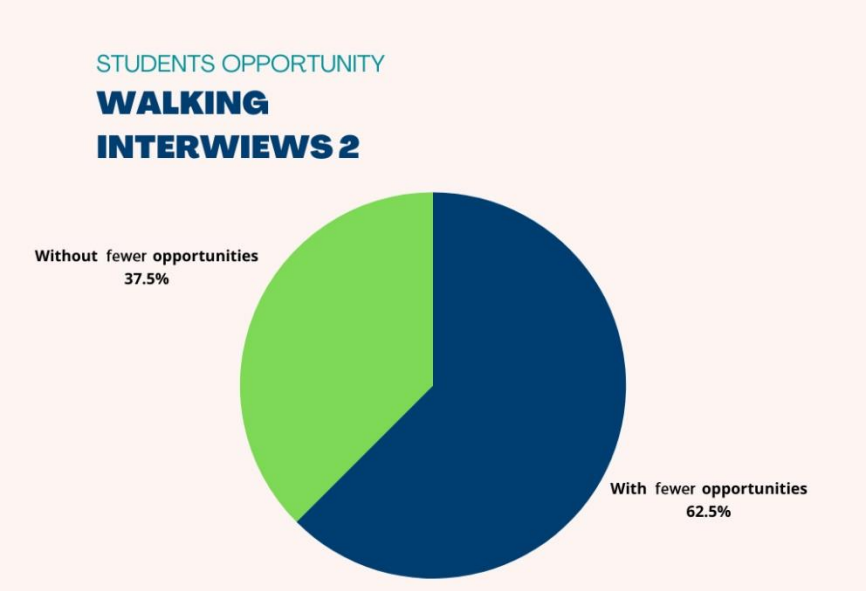

Figure 44: Students who identify themselves as having fewer opportunities in walking interview 2 (n= 40).

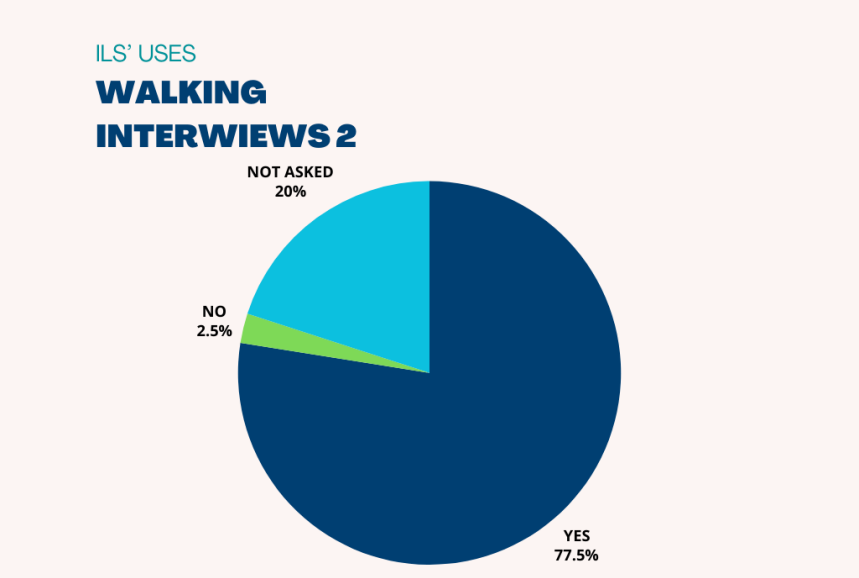

Figure 55: Students who use informal learning spaces in walking interview 2 (n= 40).

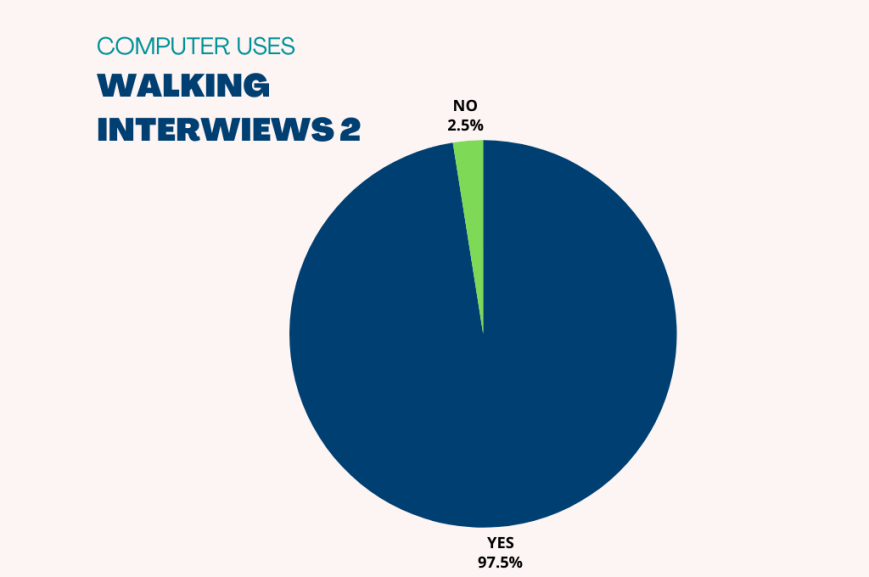

Figure 46: Students who use computer to study in walking interview 2 (n= 40).

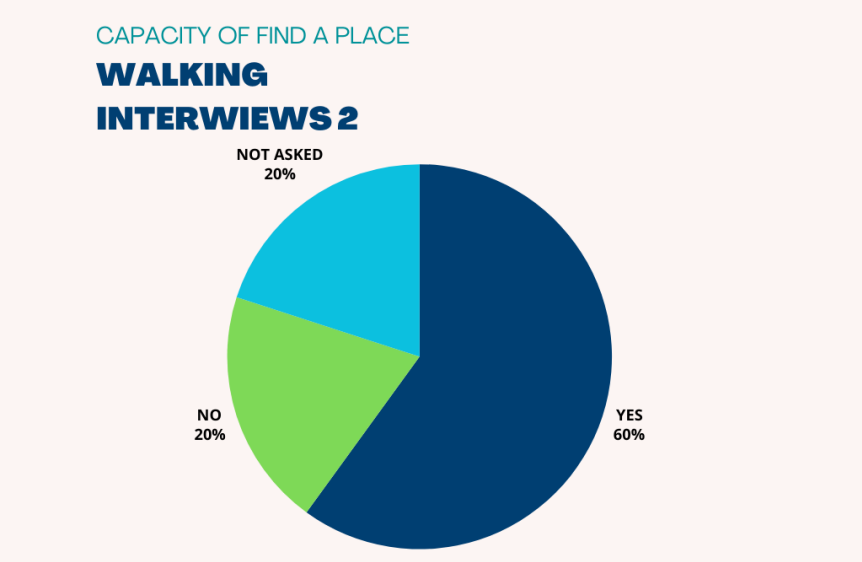

*Figure 47: **Student feed**back on being able to find a place to study on campus in walking interview 2 (n=40).*

The sample of interviewees was very diverse, making it representative of a large proportion of students. This diversity allows for additional considerations beyond those gathered in the first round.
Regarding lectures, there is not enough data to conduct a demographic analysis.

4.2. Locations

4.2.1. Classification of locations

Locations can be divided into:

- On-campus locations: These locations are located within the university campus or a university building or faculty. Within on-campus locations, partners have identified both indoor and outdoor spaces.
- Off-campus locations: These locations are not located within the university campus.

On-campus locations can be divided as follows:

- Library
- Dormitory (study hall)
- Café
- Faculty foyer
- Corridors
- Seminar room
- Canteen
- Outdoors: (green areas, canteen outside areas, sitting areas within campus buildings)

Off-campus locations can be divided as follows:

- Public spaces: Parks or beaches
- Private spaces: Home
- Privately-owned public spaces: Cafés, co-working rooms, multi-purpose spaces

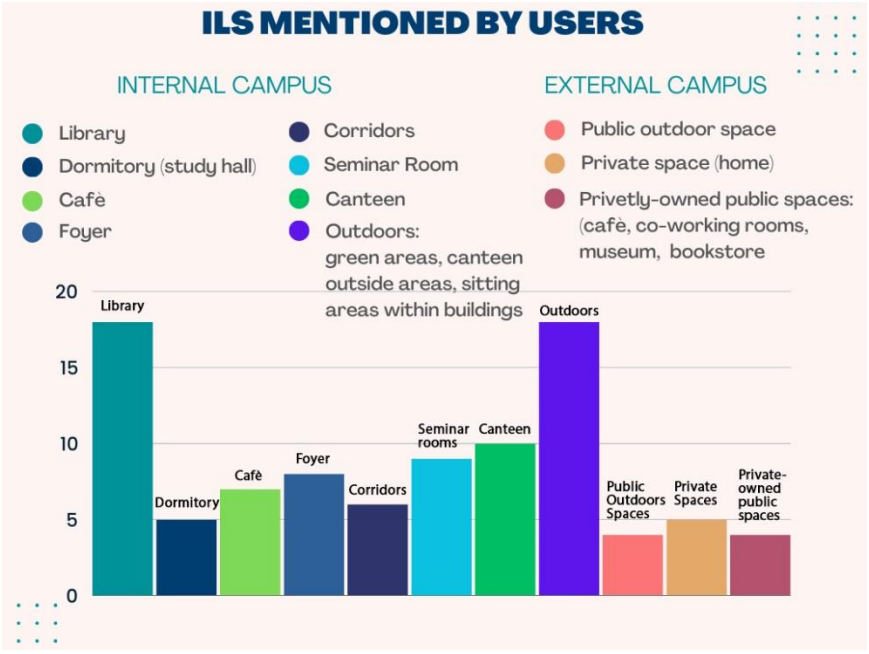

Figure 48: Types of informal learning spaces and number of mentions in on-campus walking interview 2.
ILS are divided into belonging (internal) and not belonging (external) to the Campus and differentiated by color tone.

4.2.2. Typologies and pictures of locations

Below are types, names, and some images of the selected locations for each country, specifically for the University campus (or faculty or faculty building).

4.2.2.1. University for Continuing Education Krems (Krems, Austria) (UWK)

Location	Translated Name
Foyer im 2. Stock, Trakt C (ILS2)	Foyer Tract C (2nd Floor)
ÖH Lounge (ILS3)	ÖH-Lounge
Bibliothek Leseraum (ILS4)	Library, upper floor (reading room)
Holzdeck (ILS11)	Wooden Deck
Foyer zur Bibliothek (ILS12)	Acoustic Booths Campus West

Figure 49: Foyer Tract C (2nd Floor)

Figure 50: Library Foyer

Figure 51: Wooden deck

4.2.2.2. University of Applied Sciences (Berlin, Germany) (HTWB)

Location	Name
Library (reading room)	Bibliothek (Lesesaal)
Library (group rooms)	Bibliothek (Gruppenarbeitsräume)
Seating area at the beach on the river	Strandkörbe an der Spree
Individual hallway seating areas	Einzelsitzgelegenheiten in den Fluren
Seminar rooms	Seminar Räume
Canteen	Mensa
Small canteen	Kleine Mensa (Sub-Abteil in der Mensa)
Outdoor yard	Innenhof
Outdoor benches	Bänke am Campus-Außenbereich
Group study room	Gruppenarbeitsraum (WH, B-Gebäude)

Figure 52: Library (reading room)

Figure 53: Library (group rooms)

Figure 54: Individual hallway seating areas

Figure 55: Seminar rooms

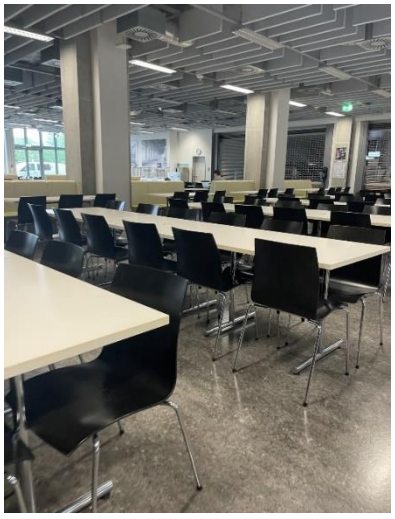

Figure 56: Canteen

Figure 56: Small canteen

Figure 57: Outdoor yard

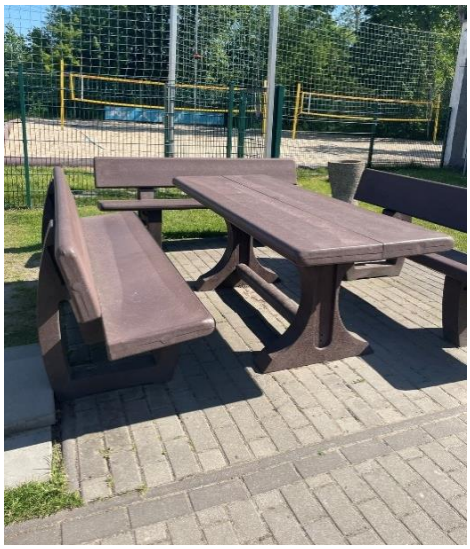

Figure 58: Outdoor benches

Figure 59: Group study room

4.2.2.3. Mykolas Romeris University (Vilnius, Lithuania) (MRU)

Location	**Name**
Main Library	Biblioteka
Main (Rothond) hall	Rotondinė salė
Interim spaces	Mokymosi vietos universitete koridoriuose
MRU yard	Kiemas

Figure 60: Interin spaces

Figure 61: MRU yard

4.2.2.4. Sapienza University of Rome (Rome, Italy) (SAP)

Location	**Name**
Main Library	Biblioteca
Faculty of Architecture corridors	Valle Giulia Corridoi
Faculty of Architecture Foyer	Piazza Fontanella Borghese main entrance
Faculty of Architecture study room	Piazza Fontanella Borghese Aula 3
Faculty of Architecture study room	Via Flaminia Aula studio
Faculty of Architecture outside study room	Via Fortuny spazi aperti
Faculty of Architecture outside garden	Valle Giulia giardino

Figure 60: Biblioteca

Figure 61: Valle Gulia Corridoi

Figure 62: Piazza Fontanella Borghese main entrance

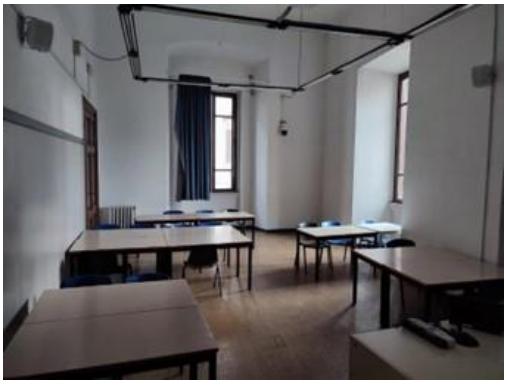

Figure 63: Piazza Fontanella Borghese Aula 3

Figure 64: Valle Giulia giardino

Figure 65: Via Fortuny spazi aperti

Figure 66: Via Flaminia aula studio

4.2.2.5. Akdeniz University (Antalya, Turkey) (AKD)

Location	**Translated Name**
Tıp Fakültesi Çalışma Salonu	Faculty of Medicine Study Room
Tıp Fakültesi Seminer Salonu	Faculty of Medicine Seminer Room
Tıp Fakültesi Hastanesi Çalışma Salonu	Faculty of Medicine-Hospital Study Room
Tıp Fakültesi Hastanesi Kantini ve Fuaye	Faculty of Medicine Canteen and Foyer
Edebiyat Fakültesi Çalışma Salonu	Faculty of Letters Study Room
Edebiyat Fakültesi Psikoloji Araştırma Laboratuarı	Faculty of Letters Psyc Lab
Eğitim Fakültesi Koridor Çalışma Alanı	Faculty of Education Corridor Study Space
Hukuk Fakültesi Kütüphanesi	Faculty of Law Library
Hukuk Fakültesi Koridoru	Faculty of Law Corridor Space
Hukuk Fakültesi Kantini	Faculty of Law Canteen
Hukuk Fakültesi Seminer Salonu	Faculty of Law Seminar Room
Hukuk Fakültesi Çalışma Salonu	Faculty of Law Study Room
Uygulamalı Bilimler Fakültesi Kantini	Faculty of Applied Sciences Canteen
Uygulamalı Bilimler Fakültesi Seminer Odası	Faculty of Applied Sciences Seminar Room
Uygulamalı Bilimler Fakültesi Kütüphanesi	Faculty of Applied Sciences Library
Edebiyat Fakültesi Derslikleri	Faculty of Letters Seminar Rooms
Edebiyat Fakültesi Kantini	Faculty of Letters Canteen
Edebiyat Fakültesi Arka Bahçe	Faculty of Letters Back Yard
Ziraat Fakültesi Kantini	Faculty of Agriculture Canteen
Olbia Çarşı	Olbia

Figure 67: *Faculty of Law Library*

Figure 68: Faculty of Law Study Roo

Figure 69: Faculty of Applied sciences Canteen

4.2.3. Characteristics and perceptions of locations

The following graphs represent the impressions of the interviewees (students and lecturers) in terms of physical characteristics, accessibility, and functionality.

4.2.3.1. Physical Characteristics

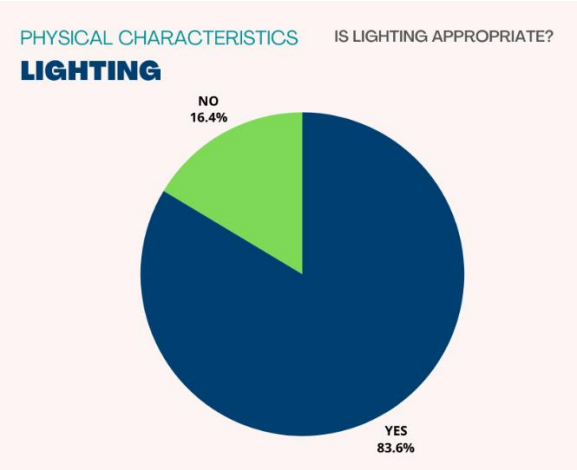

Figure 70: Spaces with appropriate lighting (n= 46).

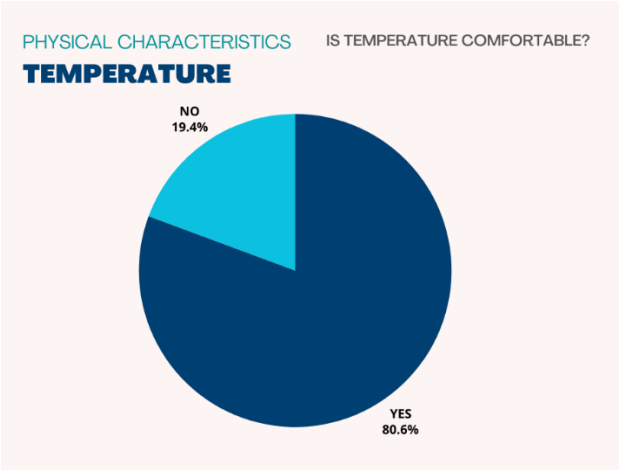

Figure 71: Spaces with comfortable temperature (n= 46).

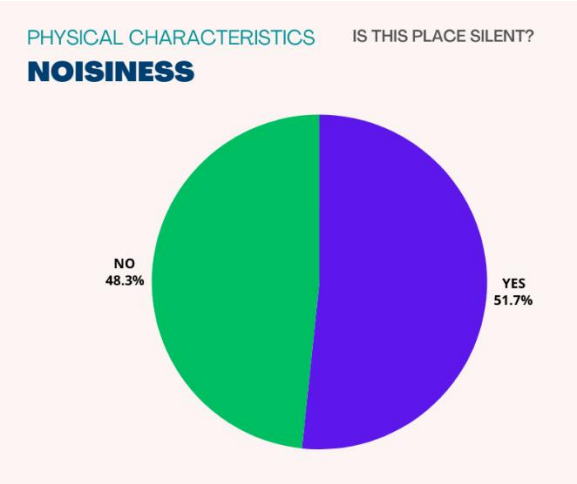

Figure 72: Spaces with appropriate acoustics (n= 46).

Based on responses collected and, on the analyses conducted, informal learning spaces appear to meet the minimum requirements in terms of lighting and temperature. The data indicate that these parameters fall within the ranges considered acceptable for user comfort and well-being.
However, data analysis highlights a significant problem related to the acoustics of informal learning spaces. The trend of the responses confirms what was already highlighted in the first round of walking interviews. For further comments, please refer to Chapter 3.

4.2.3.2. Accessibility

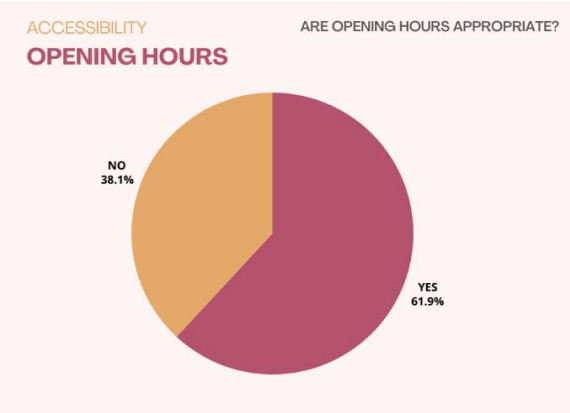

Figure 73: Accessibility in terms of opening hours (n= 46).

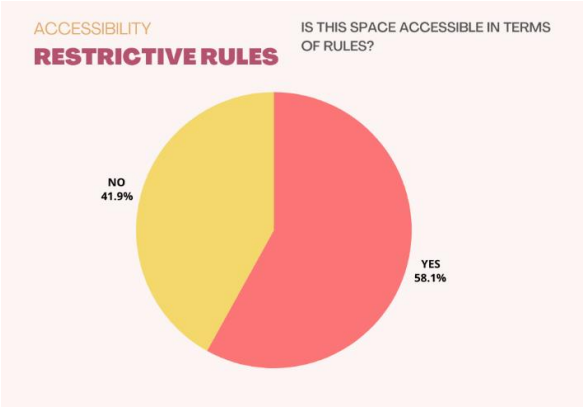

Figure 74: Accessibility in terms of restricting rules (n= 46).

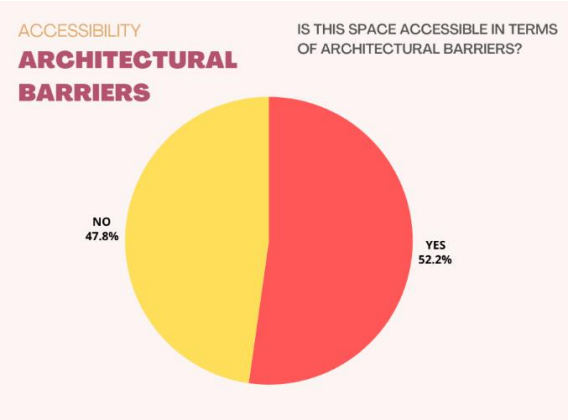

Figure 75: Accessibility in terms of architectural barriers (n= 46).

Trend of data confirms what was already evident from the previous session of walking interviews.
The analysis of the collected data highlights that architectural barriers represent a significant issue in informal learning spaces.
In addition to architectural barriers, another problem that emerged is that of the opening hours of informal learning spaces. Often, the opening hours are incompatible with the needs of students, limiting the time available for study and socialization. For further comments, please refer to Chapter 3.

4.2.3.3. Functionality

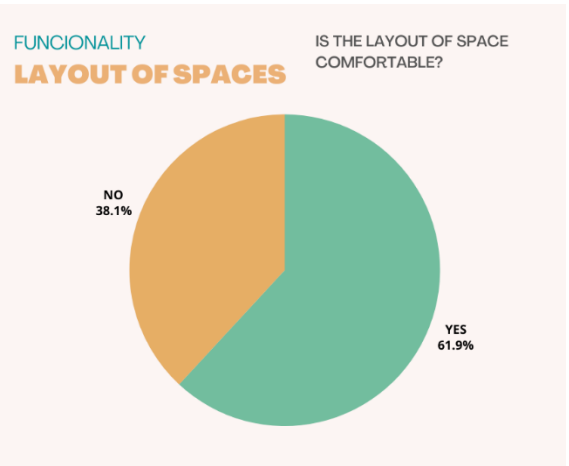

Figure 76: Space with comfortable layout of spaces (n= 46).

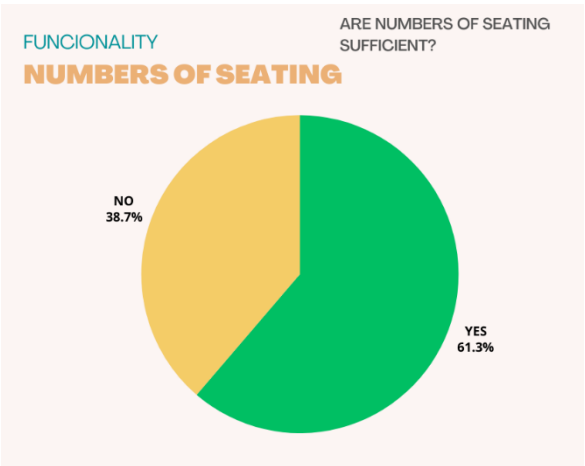

Figure 77: Space with sufficient numbers of seating (n= 46).

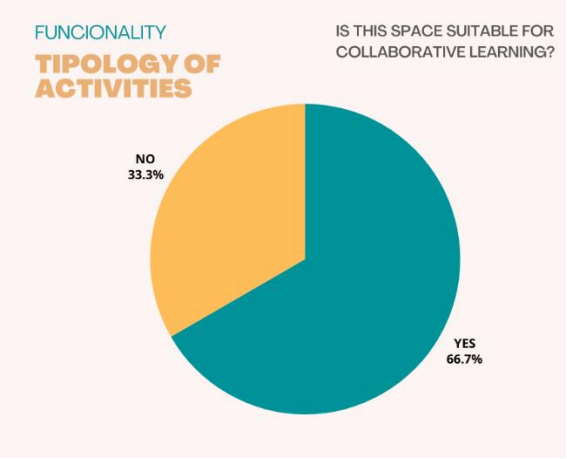

Figure 78: Space suitable for collaborating learning (n= 46).

The overall trend largely confirms the results obtained in the first round of walking interviews.
Data analysis revealed that informal learning spaces are generally comfortable, albeit with allowance for improvement. However, the percentage of users who rated them as such is not very high.
Satisfaction with the number of seats has increased compared to the first walking interviews. Regarding the types of activities most suitable for carrying out within the existing spaces, the factor of focus learning or collaborative learning was analyzed.
The analysis highlights the need to rethink informal learning spaces, considering the needs of students and current learning methods, thus confirming the data from the previous interviews. For further considerations, please refer to Chapter 3.

4.3. Use of the mapping platform

Following the first WI and feedback phase, the platform has undergone a series of modifications aimed at improving its performance based on the following criteria:

- Graphic interface: A comprehensive restyling of the graphic interface has been carried out, with particular attention to aesthetics, including the creation of a new logo.
- Navigation: New filters have been implemented to optimize the search for ILS, and a multilingual search mode has been adopted to favor a culturally inclusive approach.
- Visualization: Pictures and images have been integrated to allow users to have a first visual contact with the reference environments, facilitating a more subjective choice

The following objectives have been pursued:

- Increase the intuitiveness of the platform, making it more accessible to a wider audience.
- Promote more efficient ILS search, optimizing the information retrieval process.
- Favor a multicultural approach, making the platform usable by users from different linguistic backgrounds.
- Improve the overall user experience, offering a more enjoyable and engaging navigation.

The effectiveness of the implemented modifications is evaluated through an analysis of the platform usage data, collecting user feedback and monitoring performance parameters in the second round of WI.

4.3.1. User's feedback

The following reports the results related to user feedback from all countries, divided by lectures and students, for the second round of WI.
Questions for each result are the same as those proposed in the first round and are as follows:

- Question 1: Could the web app help you find a place to study?

- Question 2: Is the web app easy to use?
- Question 3: Do you find the search filters included in the platform useful?
- Question 4: Do you like the graphical interface of the web app?
- Question 5: Would you consider using the web application in the future or recommend it to others?
- Question 6: Do you think the platform technology makes information more accessible and usable for everyone?
- Question 7: Do you think the platform can be useful for students with fewer opportunities?
- Question 8: Is it easy for you to find the spaces or information that best suit your needs?

Please note that Question 2, Question 4, Question 6, and Question 8 were not asked to 8 students. Lecturers were only asked Questions 2, 3, 4, 5, 6, and 7.

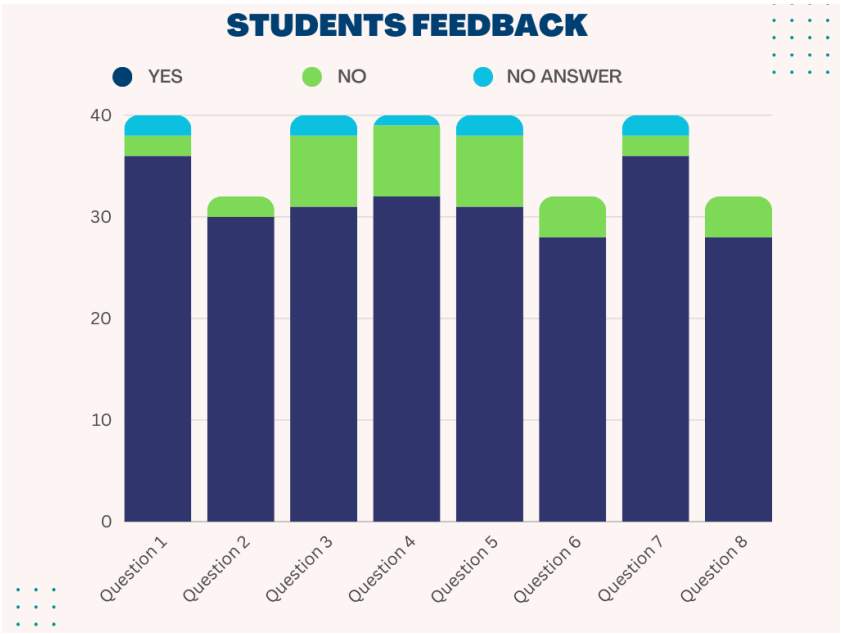

Figure 79: Feedback on the features of the Mapping Platform from Student Participants in walking interview 2 (Questions 1,3,5,7, n = 40; Questions 2,4,6,8 n= 32).

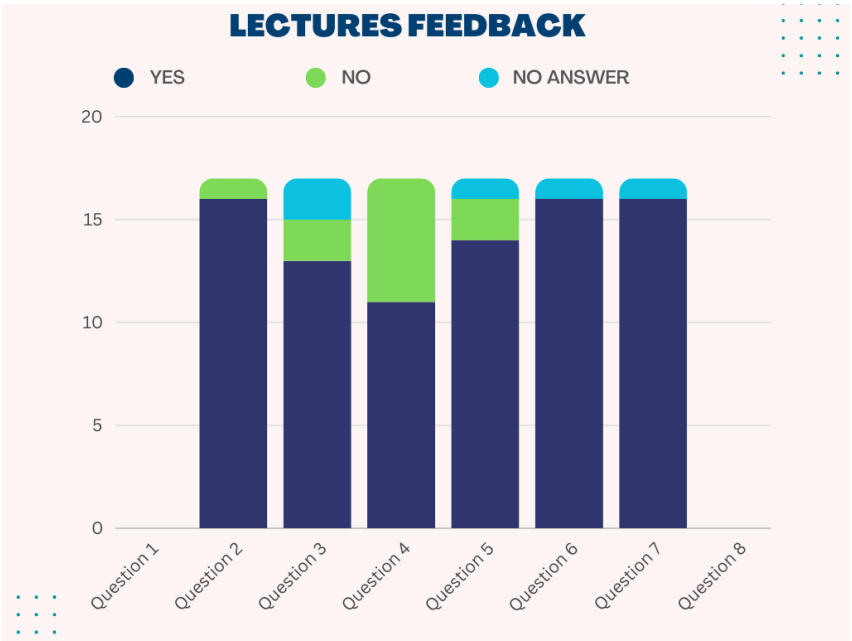

Figure 80: Feedback on the features of the Mapping Platform from Lectures Participants in walking interview 2 (n=17).

In reference to the presented graphs, a clear improvement is observed, compared to the first round of evaluation of the mapping platform, regarding the responses related to usability and user experience by both students and lectures.
The positive evaluations regarding the accessibility and inclusivity of the platform are confirmed. It is mainly perceived as a support tool for individuals with fewer opportunities, as it facilitates the transmission of information in a simple and intuitive way.
As for the graphical aspect of the application, there is a lower level of appreciation compared to the functionality (especially on the part of lectures), even though with average values in clear improvement compared to the first round of evaluation.
Despite the lower appreciation for the graphical aspect, it is important to underline the growth compared to the first round of evaluation.
The results obtained indicate a positive evolution of the mapping platform, with appreciation for its usability, accessibility, and inclusivity. However, further attention should be paid to the graphical aspect to further improve the user experience.
The study concluded with the exploration of possible future implementations for the mapping platform of informal learning spaces (ILS), collecting feedback from students and lectures (for further details, please refer to chapter 3).
The following highlights the student responses to the following questions:

- Question 9: Would you like the platform to be shared with students in others faculty?
- Question 10: Would you like the platform to be shared with faculty as well?
- Question 11: Would you like to implement a web-app with a 3D space through which you can meet people (via avatars) and exchange information, chat, and files with them?

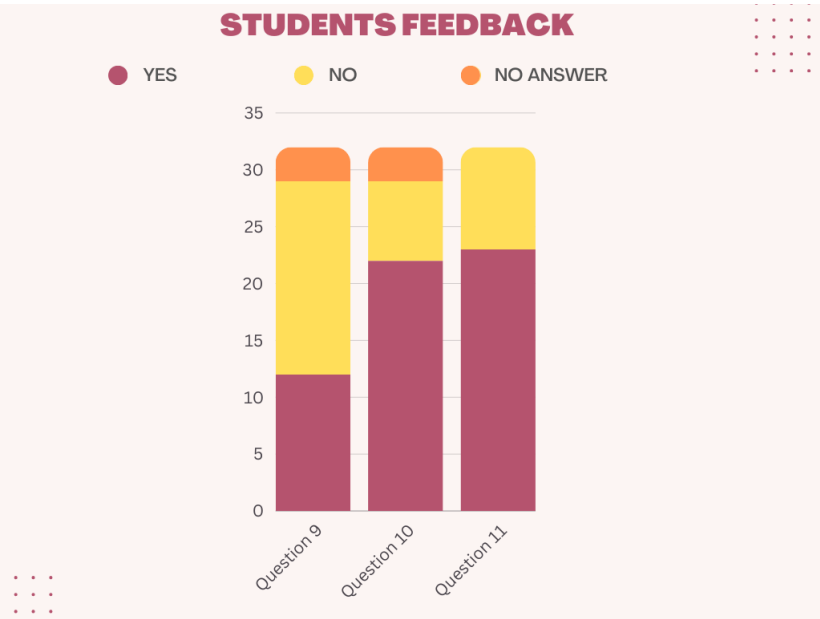

Figure 81: Feedback on the implementation of the Mapping Platform from Students Participants in walking interview 2 (n=32).

The proposals for future implementations were welcomed with interest by the students, confirming the findings of the first round of WI. For lectures, there is not enough data to make estimates. Students expressed appreciation for the possibility of accessing information about ILS from different faculties and interacting with lectures in a virtual environment.
The greatest appreciation was expressed in terms of creating a metaverse (3D space) where students, lecturers, and administrators can exchange information and make the learning process more engaging and interactive.
The proposed implementations represent an opportunity to expand the functionalities of the ILS mapping platform and to improve the student learning experience. Further research should be conducted to assess the feasibility and effectiveness of these implementations, considering the needs and preferences of users.

4.4. Reporting of comments made by participants during the interviews

General comments emerging from the interviews conducted within the project are summarized, focusing on the opinions expressed by both students and lectures.
Student comments: Students expressed great appreciation for the opportunity to be involved in a project that focuses on their needs. They have highlighted the value of being able to provide direct feedback and actively contribute to the improvement of university spaces.
Teacher comments: Lectures underlined the usefulness of the project to acquire greater awareness of the different spaces available, their criticalities, and their strengths. This has allowed them to identify with greater precision the areas that need improvement and to plan targeted interventions to be discussed with the administration.

In addition, students express the desire for university to collaborate with them to make the spaces better and want student associations to be created that work on this.
Further comments focused more on the usefulness of the mapping platform, rather than on informal learning spaces; therefore, the latter have been omitted in this second round of WI.

4.4.1. Comments about mapping platform

Critical points emerged regarding the use of the mapping platform are analyzed in reference to usability, usefulness, and integration with other platforms.

- Usability on smartphones: The platform, designed primarily for use on laptops, is not well optimized for use on smartphones, the device most used by students to search for university spaces.

- Integration with other systems: Users request greater integration of the platform with the university's website and with educational platforms such as Zoom and Moodle. The goal is to create a single container that encompasses all the elements necessary for learning, avoiding the proliferation of separate platforms.

- Lack of real-time updates: The platform does not provide real-time information on the occupancy of spaces and the availability of seats, limiting its usefulness for students.

- Lack of a booking system: Users request a booking system for available spaces, guaranteeing them a secure seat and allowing for better management of the student flow.

Suggestions for improvement:

- Constant updating of information on spaces and their characteristics.
- Inclusion of information on the current regulatory restrictions in the spaces (e.g., food ban, mandatory silence).
- Implementation of personalized search filters for each faculty, adapting the platform to the different study needs.
- Integration of filters for the tools available in the spaces (projector, screens, etc.).
- Provision of detailed information on internet access in the spaces.
- Enabling students to upload photos and comments, to offer a more complete and updated view of the spaces.
- Integration of an interactive map to facilitate the visualization of campus and the planning of routes.
- Creation of a virtual space for free user comments, to collect feedback and suggestions for improving the platform.

Critical points that emerged highlight the need for an evolution of the mapping platform towards a completer and more integrated hybrid learning system. Integration with the university's website and with educational platforms, real-time updating of information, and the implementation of a booking system represent fundamental steps in this direction. Student suggestions offer interesting insights for improving the mapping platform, emphasizing the importance of greater personalization and interactivity.

While the critical points are evident, the mapping platform has also received positive feedback regarding its ease of use, the completeness of the information, and its usefulness for searching for ILS. These aspects represent the strengths on which to build for the future development of the platform.

5. Iteration of the Mapping Platform

5.1. After the first round of walking interviews

The initial version of the mapping platform was developed effectively. However, as expected, several updates were required to further develop the platform for future usage. In general, most survey participants said the mapping platform was simple to use, and the design of the initial edition of the mapping platform got good feedback. However, as predicted, there were several pain points that needed to be addressed, as well as the inclusion and iteration of key features that participants stated throughout the walking interviews.

5.1.1. Improvements based on feedback

Feedback from the first round of walking interviews revealed several areas of the platform that required iteration.

The main points of feedback regarding the mapping platform were:

- **Aesthetics**: feedback suggested that the colour scheme of the mapping platform felt "cold". Therefore, the decision was made to revise the theme and replace it with something that was "warmer", therefore the colour scheme went from blue to orange. In addition, other comments focused on the website's graphics "should be updated" or that there was "too much text". Adjustments were made accordingly.
- **Location Images:** should be included for better comprehension of the locations. This included as thumbnails representing the locations when returned via the search results. An example of this is shown in Figure 82.
- **Filtering options:** the filtering system's excess of options was a notable issue. It should be noted that this result was widely anticipated during the initial round of walking interviews, particularly considering that we were aiming to establish which filtering options were more effective than others.
- **Campus Maps:** implementing interactive or analogue maps was suggested to improve the user's understanding of the location of the learning spaces. Ultimately, analogue maps were implemented.
- **Language:** the website was automatically translated for each language based on a WordPress plugin. However, feedback revealed that the translations were not adequate. In response to this, the mapping platform was updated so that it featured manually translated versions of the website into Turkish, Italian, Lithuanian, German, and English. Figure 83 shows an example of how material that has been natively translated (by project partners). In this example, users can click on the language tab to see the text presented in English, in their native language.

5.1.2. Additional iterations

In addition to the features that were mentioned during the walking interviews, with consideration regarding several key aspects (e.g., GDPR, ethics, etc.), we decided to make the following changes:

- Forums: were part of the initial deployment of the mapping platform. The intention of the forums was to develop a hub for students across all schools to interact with and help to promote and strengthen relationships primarily among ERASMUS students. However, we noted during the first round of walking interviews that students did not engage with nor found the use of a forum existing within the mapping platform.
- Google Drive: like dedicated Zoom spaces, there was a dedicated Google Drive folder for each location. However, these folders were removed due to privacy, policy and content upload concerns (e.g., type of content students could upload, legal responsibilities, and university online sharing policies.

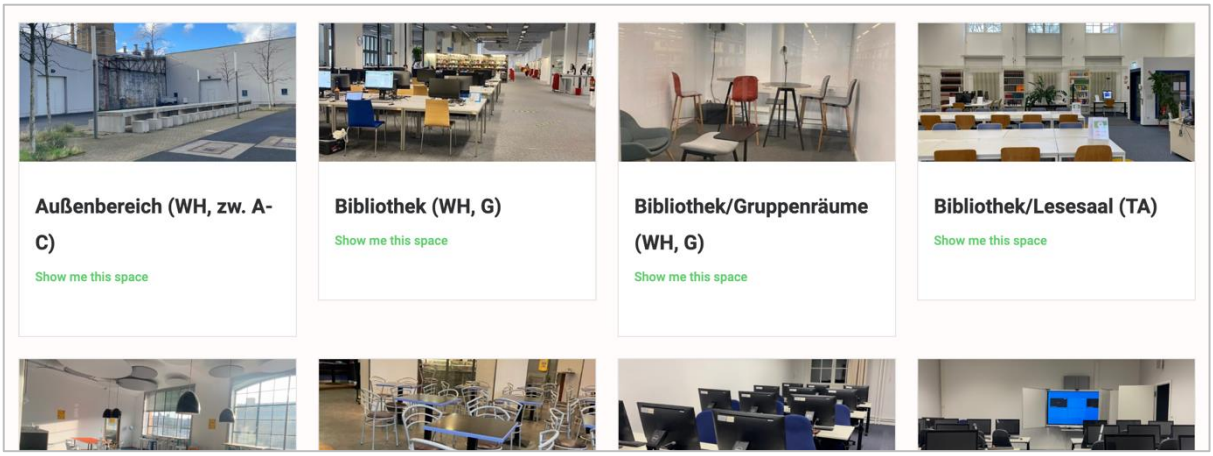

Figure 82: An example of the location thumbnails (HTW) https://www.niilsmappingplatform.eu/main_htwb/

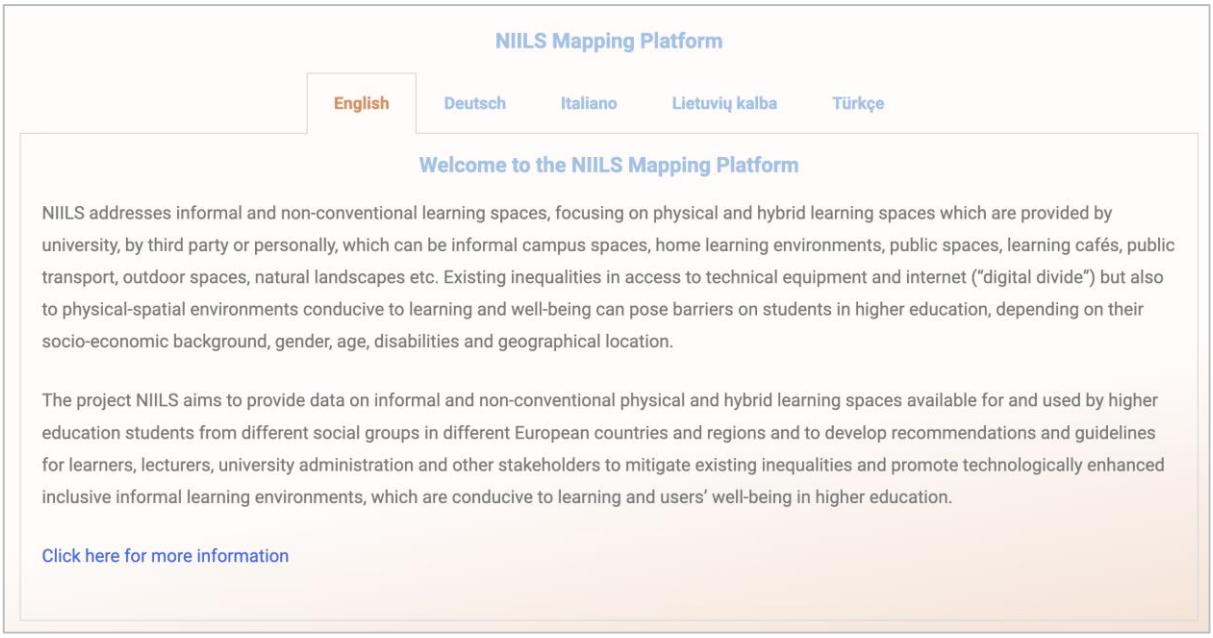

Figure 83: Addition of language support on the homepage of https://www.niilsmappingplatform.eu/

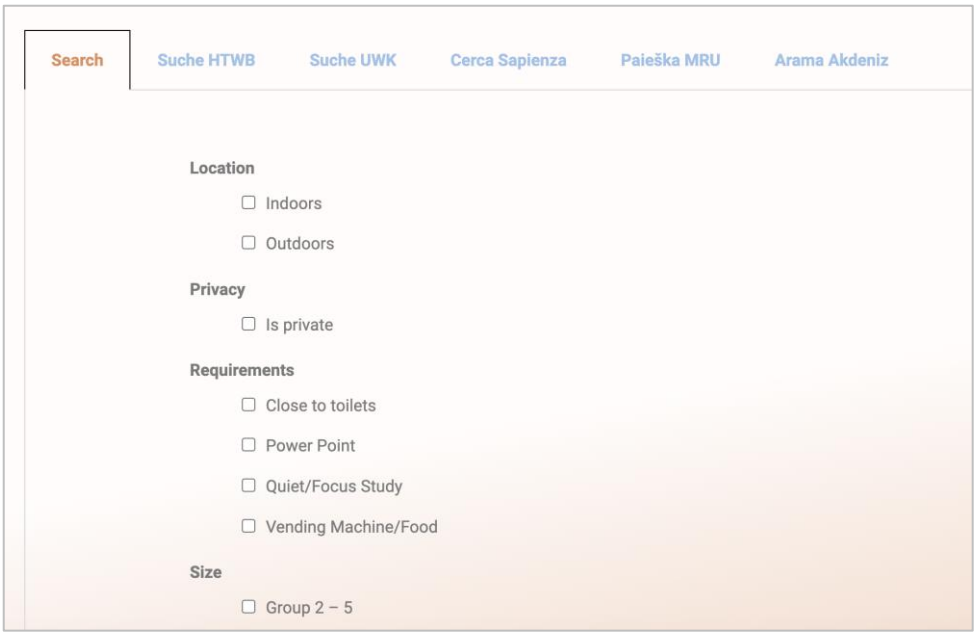

Figure 84: Addition of language support on the location search https://www.niilsmappingplatform.eu/filtering-system

The fundamental goal of the mapping platform was to establish a user-friendly tool that allows students to readily discover suitable study places, hence increasing academic productivity and the overall learning experiences that they have on campus. The mapping platform attempts to reduce a typical challenge students encounter in locating acceptable study surroundings by providing a comprehensive database of study areas, full of important information such as location, noise level, accessible facilities, and user evaluations. The potential benefit of such a resource extends beyond individual students. For example, making students aware of the informal learning spaces on campus that they can use either for self-study or to collaborate in may have a positive impact on improving academic achievement and general morale within the university.

5.2. After the second round of walking interviews

The second round of walking interviews provided further feedback that confirmed the validity of our approach to developing the mapping platform and its ability to achieve the set goals. Indeed, the feedback gathered during the second round highlighted a general appreciation for the functionalities implemented in the first version of the mapping platform. The modifications requested by users mainly focused on aspects of detail and customization, confirming the soundness of the direction taken.
Changes made following this round, although limited in number, were aimed at further improving the efficiency and effectiveness of the platform.

5.2.1. Improvements based on feedback

Feedback from the second round of WI revealed a few areas of the platform that required iteration.

- **Aesthetics**: Creation of a new visual identity for the project and consequently for the platform, through the creation of a new logo to make the image more modern, attractive, and versatile, and simultaneously reach a younger target audience.

- **Locations image**: The image gallery has been expanded with the addition of high-quality photos that accurately represent the study spaces.

- **Filtering options**: The filtering system has been further optimized to make it more intuitive and precise, making it easier to search for study spaces based on the specific needs of users.

- **User implementation**: A form is inserted in the mapping platform, through which students can report the insertion of new ILS not included on the site. The idea of automatic insertion by all users has been

discarded because otherwise there should be constant control of the sources and the veracity of the data entered independently by users, as well as a moderator (Figure 85).

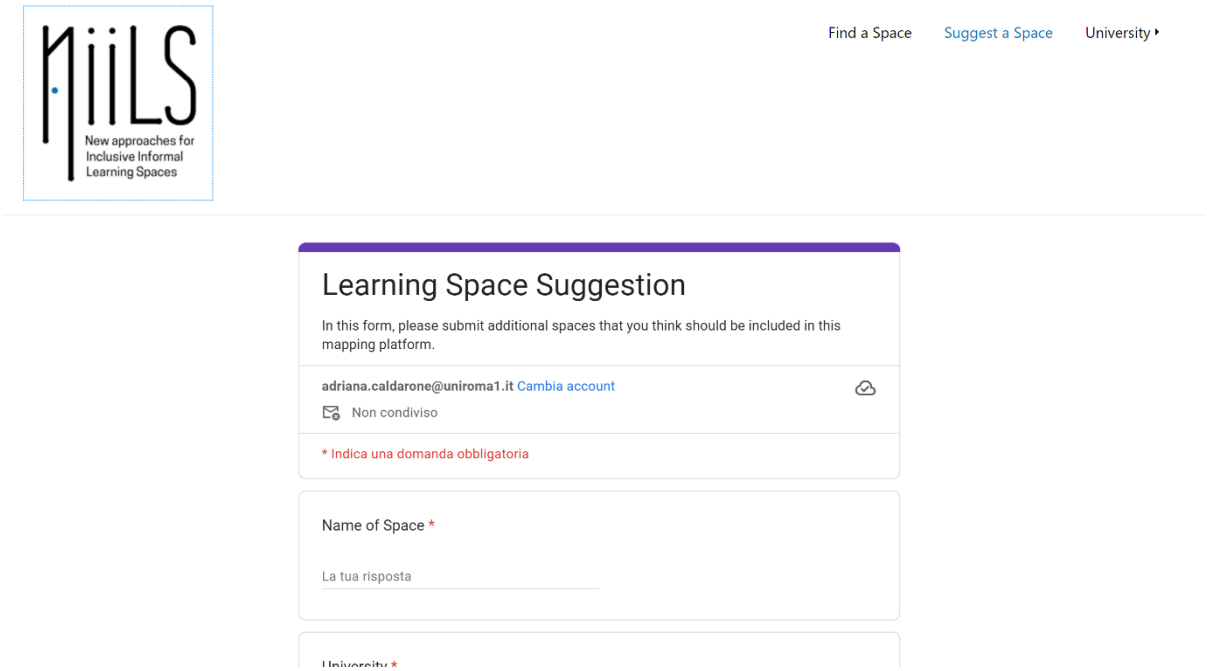

Figure 85: User Reporting Form for Existing ILS not included on the Mapping Platform

5.2.2.1. Logo Restyle

The redesign of a logo is a sensitive and strategic operation that requires a deep understanding of the project and its target audience. The main objective was to modernize the image of the logo while maintaining its recognizability and consistency with the values of the NIILS project.
The following phases were followed:

- Phase 1: Analysis and Research
  Analysis of the existing logo: The first phase consists of a careful analysis of the existing logo, evaluating its effectiveness, recognizability, and consistency with the project's values. It is essential to understand the meaning of the logo to the target audience.
  Market research: Market research is conducted to understand logo design trends in the reference sector and to identify the tastes and preferences of the target audience.
  Competitive analysis: The logos of the main competitors are analyzed to identify the strengths and weaknesses of the existing logo and to identify any areas for improvement.

- Phase 2: Concept Development
  Brainstorming and ideation: Various ideas are generated for the new logo, considering the results of the analysis and research conducted in the previous phase.
  Development of drafts: The most promising ideas are developed into graphic drafts, using specific design software.
  Evaluation and selection of drafts: The drafts are evaluated by all project partners based on criteria of aesthetics, functionality, recognizability, and consistency with the values of the NIILS project. The final draft is selected based on these criteria.

- Phase 3: Refinement and Finalization
  Refinement of the selected draft: The selected draft is refined and perfected, making any necessary changes to optimize its design and functionality.
  Creation of a logo style guide: A logo style guide is created that defines the rules for using the logo in all its variations.

Figure 86: NIILS project logo

Figure 87: NIILS project new logo for platform

The NIILS project has unveiled a new logo specifically designed for its mapping platform. This seemingly simple choice is rooted in well-defined motivations that deserve deeper exploration.
From a practical standpoint, the adoption of a unique font for the project name and a minimalist design devoid of additional images and graphics addresses two concrete needs. Firstly, it enhances the text's readability, making it more suitable for a primarily young audience, which represents the platform's core users. Secondly, it lends a more modern and minimalistic appearance to the logo, aligning it with contemporary aesthetic trends.
However, the reasons behind creating a dedicated logo for the mapping platform extend beyond the realm of practicality. They are also firmly anchored in a well-defined ideological framework. Primarily, this new visual element serves to unequivocally distinguish the platform from the NIILS project. In doing so, it underscores the platform's autonomous and enduring nature, suggesting that its value will not dissipate with the conclusion of the NIILS project but will continue to provide benefits well into the future.
Furthermore, the platform's logo assumes an identification role for a broader audience than the NIILS project partners. The platform envisions itself as a collaborative space open to all stakeholders, managers, facilitators, students, and faculty, emphasizing its inclusivity and its aspiration to become a long-lasting work tool.
In essence, the new logo for the NIILS mapping platform represents a well-considered strategic choice that reflects both concrete needs for readability and usability and ideological objectives aimed at emphasizing the platform's autonomy, inclusivity, and enduring nature. Through this new visual element, the NIILS project intends to reinforce its identity and clearly communicate the intrinsic value of the mapping platform as a work and collaboration tool for a diverse audience.

5.2.2. Additional iterations

Several additional changes were proposed to meet the specific needs expressed by users. However, some of these were ultimately discarded due to the following reasons:

- **Booking system (for rooms): was a feature mentioned several times, however, given the number of fiscal resources and time remaining on the project, and the frequency of changes of the rooms and their availability, the implementation of a booking feature was disregarded.**
- **Mobile Application**: was a common request across walking interviews. However, while it was acknowledged, given time and resources remaining on the project, it was not a feasible option to develop.
- **Zoom:** dedicated Zoom rooms also were developed to strengthen connections between students. The main idea behind a dedicated corresponding Zoom room with their physical location aimed to provide a real-time bridge between those who were online and could not be physically present to interact with students who were physically located within the spaces. The choice to remove the dedicated Zoom spaces was primarily based on privacy concerns.
- **Data updating:** A sustainability plan has been developed to ensure continuous data updates. This plan outlines the guidelines for all involved partners, specifying the methods and frequency of data updates. Additionally, it establishes criteria for the long-term economic sustainability and information management of the platform.

6. Discussion

This study presents research conducted on the topic of informal learning spaces (ILS) in universities. Research used a mixed-methods approach, combining qualitative and quantitative methods, to collect data and evaluate the usability of ILS and the effectiveness of an online mapping platform for their identification.
The strengths and weaknesses of the approach followed are analyzed below.

6.1. Strengths

Research is distinguished by its adoption of a rigorous user-centered approach, characterized by the active involvement of students and faculty in the design and evaluation phase of the mapping platform. This methodology has allowed the collection of high-quality qualitative and quantitative data, ensuring the triangulation of results and the robustness of conclusions.
The use of multiple data collection tools, including walking interviews with questionnaires, feedback, and data analysis, all structured in two distinct phases, has significantly expanded the type and number of interviewees, ensuring a broader and more diversified representation of the reference population. This methodological choice has allowed for a deeper and more nuanced understanding of the needs of users and their use of ILS.
The results of the study offer information not only on the needs of users in terms of functionality and usability of the mapping platform but also on how students and faculty perceive and use ILS in general. This knowledge is of fundamental importance for the continuous improvement of the platform and for the design of more effective informal learning spaces that meet the needs of users.
The study does not simply present the results obtained but also puts forward concrete proposals for future implementation to optimize the mapping platform and make the most of the potential of ILS.

6.2. Weaknesses

List of weaknesses identified in the research:

1. Lack of contextual diversity: The study focuses exclusively on ILS within universities, limiting the generalizability of the results to other educational contexts, such as schools, libraries, or training centers. It would be appropriate to expand the research to understand the different facets of ILS in different settings.

2. Limitations in effectiveness evaluation: The online mapping platform, while a valuable tool, has not been evaluated in terms of its actual impact on student learning. It would be necessary to implement longitudinal studies to determine whether the use of the platform effectively influences learning outcomes.

3. Lack of ethical considerations: The text does not address the ethical implications of collecting and using user data within the mapping platform. It is essential to establish clear anonymization protocols and informed consent to protect student privacy.

4. Unimplemented future implementations: Some of the proposed future implementations, such as the booking system and the mobile app, were not implemented due to time and resource constraints.

5. Unresolved platform usability issues: Some of the criticisms that emerged regarding the use of the mapping platform, such as the lack of real-time updates and a booking system, have not been fully resolved.

6.3. Future research questions and future developments

The findings of this study open new research questions that need to be further explored in subsequent studies. These questions, ranging from purely didactic aspects to accessibility and inclusion issues, represent fertile ground for investigation to expand our knowledge of informal learning spaces (ILS) and their impact on university learning.

1. The influence of the physical characteristics of ILS:
A crucial area of investigation is to explore how the physical characteristics of ILS influence their use by students. The size, configuration, furnishings, and lighting of spaces can have a significant impact on student behavior, their level of concentration, and their engagement. Future studies should investigate these relationships in more depth and identify the optimal physical characteristics to promote effective learning in ILS.

2. Preferred learning modalities in ILS:
Understanding students' preferred learning modalities in ILS is essential for designing spaces that best meet their needs. Future research should investigate the different learning styles of students and how these adapt to different informal learning contexts. The results of this research can be used to personalize ILS and make them more inclusive for all students.

3. Improving ILS to meet student needs:
Universities have a crucial role in improving ILS to meet student needs. Future studies should explore concrete strategies for optimizing ILS, taking into account student preferences and educational research findings. Analyzing student feedback and implementing evidence-based changes can help create more effective and engaging ILS.

4. Promoting inclusion and equity through ILS:
ILS can be powerful tools for promoting inclusion and equity within the university institution. Future research should investigate how ILS can be used to create spaces that are accessible to all students, regardless of their abilities, backgrounds, or learning styles. Adopting assistive technologies and designing flexible spaces can help make ILS more inclusive and welcoming for all.

5. Adapting ILS to the needs of students with disabilities:
ILS need to be adapted to the needs of students with disabilities or different learning styles. Future studies should explore strategies for making ILS accessible to all students by providing appropriate support tools and assistive technologies. Personalizing spaces and offering individualized tutoring services can help ensure that all students can benefit from ILS.

6. Strategies for promoting awareness and use of ILS:
To maximize their potential, it is necessary to promote awareness and use of ILS among students and faculty. Future research should identify the most effective strategies for informing students about ILS, encouraging them to use them, and providing faculty with the skills necessary to integrate ILS into their teaching. Awareness campaigns, training workshops, and the integration of ILS into university information systems can help achieve this goal.

7. Advantages and disadvantages of online mapping platforms:
Online mapping platforms can be useful tools for identifying ILS, but it is important to carefully evaluate their advantages and disadvantages. Future studies should examine the accuracy, usability, and accessibility of these platforms, compare their different functionalities, and identify best practices for their use.

8. Accessibility and inclusion of online mapping platforms:
Online mapping platforms must be accessible and inclusive for all users. Future research should focus on the design of user-friendly interfaces that meet the needs of people with disabilities and are available in multiple languages. Implementing automatic translation and voice support features can help make online mapping platforms more inclusive.

9. Emerging digital technologies:
Emerging digital technologies, such as virtual reality (VR) and augmented reality (AR), offer a range of opportunities to integrate immersive and engaging learning experiences into informal learning spaces (ILS). The strategic implementation of these technologies in the mapping platform can transform the user experience by interfacing with dynamic and interactive environments that can stimulate curiosity, promote active learning, and promote a deeper understanding of complex concepts.

6.4. Technical Challenges

The development of the mapping platform was not without its challenges. One significant hurdle was the acquisition and maintenance of accurate and up-to-date information about various study locations. Given the dynamic nature of a university campus and with each country’s campuses having their own idiosyncratic features (e.g., events, changes to security/access, or even the existence of the room in the case of ongoing renovations), information about the availability of informal learning spaces constantly changes due to changes to the rooms available on campus, sometimes resulting in renovations or changes in departments. Regular updates were

implemented to ensure the reliability of the platform's content. However, given that constant changes are inevitable and thus in some cases the information may not be always completely accurate it was decided to include a disclaimer notifying the user that the information on the website was correct at the time of the last update (as show in Figure 88).

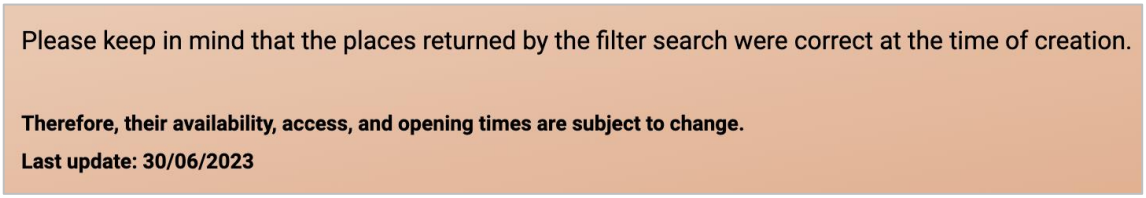

Figure 88: Disclaimer for the search results

6.5. Collaborative Ecosystem

The mapping platform has been positively reviewed by students for considerably improving their ability to locate and make use of informal learning places on campus. By enabling students to suggest new locations based on their needs and interests, the mapping platform has not only made it easier to find these spaces but also has had an impact towards creating a sense of community among students. By sharing and working together on their favorite locations, they have developed a virtual ecosystem where peer support and knowledge exchange can improve student awareness of informal learning spaces. It has made it possible for students to feel closer to their campus community, encouraging a feeling of community and fellowship outside of the classroom. In essence, the mapping platform has enhanced both the social fabric of the educational community and the physical component of identifying venues for informal learning, making it an essential tool for students seeking both information and a sense of belonging. Moreover, the mapping platform's likely success is primarily reliant on first its ease of use and then by cultivating a collaborative environment that includes students, instructors, and educational institutions. We encouraged students to offer new study place recommendations after implementing a rating system, as shown in Figure 89. This adds value to the platform's content and improves its usability.

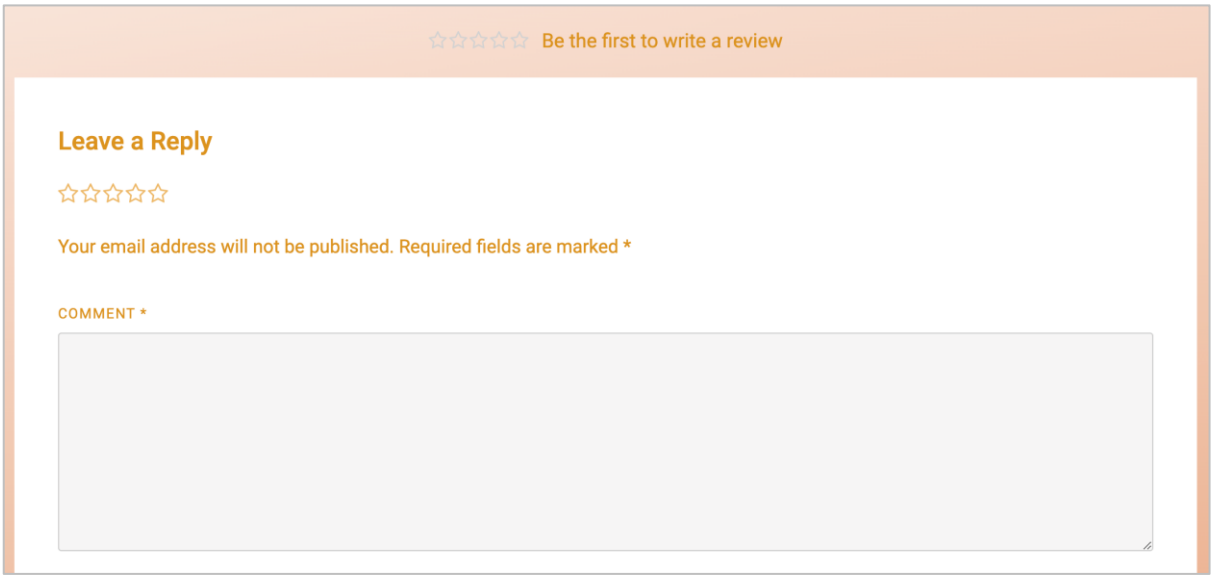

Figure 89: Rating system for informal learning space locations

6.6. Ethical Considerations

The development of a platform that gathers user-generated content necessitates careful consideration of ethical aspects, especially to conform to the rules of GDPR. Ensuring user privacy, implementing content moderation mechanisms to prevent inappropriate content, and safeguarding against the sharing of personal information. Transparency in data usage and privacy policies were established to create a trustworthy environment for users and no personal information was collected or stored. All information obtained via the walking interviews was collected anonymously with any reference to students doing so via coding (e.g., student #1, lecturer #1, and so on).

While the initial mapping platform version represents a meaningful step forward, there are several avenues for future improvement. Incorporating real-time data updates, integrating location-based services for navigation, and implementing AI-driven recommendations based on user preferences are potential enhancements that could further enhance user experience. However, the challenges that lie with such improvements would need to align carefully with the ethical collection of data as outlined in GDPR.

7. Conclusion

NIILS project and the mapping platform represent a significant contribution to the field of education by bringing to the forefront the critical role of informal learning spaces and their impact on student learning. This new perspective is grounded in a participatory knowledge approach and provides insights into students' satisfaction and well-being in relation to these spaces.
Continuous research and development, together with data-informed practices, are essential to realize the full potential of these spaces.
Scientific debate on the topic of ILS is constantly evolving. Several scholars have emphasized the importance of these spaces for promoting active learning, collaboration, and creativity among students.
However, research on ILS is still in its early stages, and further studies are needed to better understand their optimal characteristics and their impact on student learning, as well as to develop effective strategies for their management.

Some promising research areas include:

- The impact of ILS on different learning outcomes, such as knowledge, skills, and competencies
- The characteristics of ILS that promote active learning, collaboration, and creativity
- The role of technology in enhancing ILS

The results of research on ILS can be used to inform the design, development, and management of these spaces. Some practical implications include:

- Considering the needs and preferences of students in the design of ILS
- Providing a variety of spaces and environments to accommodate different learning needs
- Using technology strategically to enhance ILS
- Providing students with the support they need to use ILS effectively
- Regularly evaluating ILS to ensure they meet student needs

The presented research offers a contribution to the understanding of the current status on existing ILS and such results can be used by universities to improve the student learning experience in informal spaces.
Mapping platforms can be a useful tool to help students finding ILS that suit their needs. However, it is important to ensure that these platforms are accessible, inclusive, and easy to use. In addition, further features need to be developed to make mapping platforms more informative and engaging.
The NIILS project has successfully demonstrated the value of user-centered inquiry and technological innovation in improving informal learning spaces, their use, and their dissemination. By systematically collecting user feedback through walking interviews and surveys, the project team was able to identify key areas for improvement of the ILS and implement targeted changes to the mapping platform. This iterative approach has led to a more user-friendly, accessible, and inclusive platform that better meets the needs of students and faculty.
User needs and preferences vary depending on different groups of students and faculty. It is important to consider these differences when designing and implementing new features and services.
Informal learning spaces should be designed to support a variety of activities and learning styles. This includes providing quiet spaces for focused activities, as well as collaborative and open spaces.
This study is fundamental to continue investing in research on ILS to better understand their optimal characteristics and their impact on student learning, as it emerges as a solid foundation for the development of guidelines for the design, development, and management of ILS.
The next steps are to promote the use of ILS among students, faculty, and administrators, creating learning communities, research networks, and collaboration to share best practices and promote innovation in the field of ILS.
Therefore, it is necessary to continue collecting user feedback to identify new areas for improvement.
It is also important to explore the use of emerging technologies, such as virtual reality and augmented reality, to create even more engaging and immersive learning experiences.
The key points to focus on for the next steps can be summarized as follows:
Involve students, administrators, and faculty in the design and development of ILS, also through learning communities. This will help ensure that the spaces meet their needs and expectations.

Promote and publicize ILS to students and faculty. This will help raise awareness of the spaces and encourage their use.
Regularly evaluate ILS to ensure they meet the needs of users.
Finally, it must be added that the NIILS project is a testament to the power of international collaboration. Researchers from different countries and disciplines have come together to share their expertise and work towards a common goal. This type of collaboration is essential to address the complex challenges in education and the spaces in which it operates.

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