Synthesis Report of Project Result 2

Users' perspective analysis: usage, perception, and impact of informal learning spaces

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Berlin, 06/2024

NⅠi𝓛S New Approaches for
Inclusive Informal Learning Spaces

Co-funded by
the European Union

NIiLS New Approaches for
Inclusive Informal Learning Spaces

Content

List of abbreviations

AKD	Akdeniz University (Antalya, Turkey)
CL	Collaborative learning
FL	Focused learning
FGI	Focus Group Interview(s)
HTW	HTW Berlin - University of Applied Sciences (Berlin, Germany)
ILS	Informal learning spaces
MRU	Mykolas Romeris University (Vilnius, Lithuania)
NIILS	New Approaches for Inclusive Informal Learning Spaces
SAP	University of Sapienza (Rome, Italy)
SWFO	Students with fewer opportunities
UWK	University for Continuing Education Krems (Krems, Austria)

1. Introduction

This synthesis report consolidates the findings from Project Result 2 of the *New Approaches for Inclusive Informal Learning Spaces* (NIILS) project, titled "Users' Perspective Analysis: Usage, Perception, and Impact of Informal Learning Spaces." The individual reports were elaborated by the partner universities of the NIILS project: Akdeniz University (Antalya, Turkey; AKD), Hochschule für Technik und Wirtschaft Berlin (Berlin, Germany; HTW), Mykolas Romeris University (Vilnius, Lithuania; MRU), Sapienza (Rome, Italy; SAP), and University for Continuing Education Krems (Krems, Austria; UWK). Accordingly, HTW Berlin summarized the overall findings from a meta perspective.

According to Oldenburg's (1999) differentiation of spatial settings, informal learning spaces (ILS) can be distinguished between "*first places* (home), *second places* (at the university), and *third places* (public settings)" (Beckers et al., 2016, p. 245), this user analysis aims to examine which places are used most frequently for learning activities by the students of the participating project partner universities.

Particularly with regard to *second places,* different frequencies of use concerning learning spaces on campus, such as seminar rooms, interim spaces (i.e., corridors, foyers, niches, assembly halls), student lounges/work areas, the canteen/cafeteria, the university library, are investigated. Additionally, the use of *first places* (home) and *third places* (public places), such as public libraries, public transport, cafés, outdoors (i.e., parks, beaches, forests, lakes) and temporary accommodations (e.g. hotels, guesthouses, etc.) are also investigated.

Overview of partner universities

Before delving the methodology and associated data for this work package, it is important to review the individual university and country-specific data of the NIILS project partners. These differ in many ways, for example in terms of campus size, population density, number of students, staff members, faculties, study programs, fields of study offered, etc. (cf. Table 1). The differences among these countries and universities, coupled with the multifaceted campus configurations depicted in the appended maps (cf. Appendix Figures 1-5), serves as fundamental contextual information. This contextual understanding substantiates a more comprehensive exploration of the congruities and disparities inherent in the user-centric analysis concerning the utilization, perception, and impact of ILS. Table 1 illustrates significant disparities among project partners, notably seen in the urban expanses of Antalya and Rome, surpassing others in geographical size and university enrolment across multiple faculties. Conversely, MRU and UWK represent smaller-scale institutions situated in comparatively smaller cities. HTW Berlin, while nearly twice the size of MRU and UWK, remains substantially smaller than AKD and SAP. Notably, it resides within a city boasting the highest population density among the participating project partners. Despite UWK's status as one of the smaller universities among the partners, it offers the most extensive array of study programs, notably emphasizing postgraduate education (see

Table 1).

University	City/ country	Urban area (km²)	Inhabitants	# Students	# Staff	University's founding yr.	# Faculties	# Study programs	Fields of study
AKD	Antalya, Turkey	1,417	~ 2,600,000	~ 67,000	~ 7,070	1982	24	171	Social science, Health science, Fine arts, Education, Medicine, Engineering, Law, Business, etc.
SAP	Rome, Italy	1,287	~ 2,800,000	~ 100,000	~ 10,500	1303	11	500	Architecture, Economics, Pharmacy & Medicine, Law, Civil & Industrial Engineering, IT, Humanities & Philosophy, etc.
HTW	Berlin, Germany	892	~ 3,700,000	~ 14,000	~ 900	1994	5	75	Business, Engineering, Computer science, Design and Culture
MRU	Vilnius, Lithuania	401	~ 570,000	~ 7,500	~ 400	1990	4	21	Law, Public Security, Human and Social Studies, Public Governance and Business
UWK	Krems, Austria	52	~ 25,000	~ 8,000	~ 720	1995	3	200	Business and Globalisation, Health and Medicine, Education, Arts and Architecture

Table 1. Project partners' country and university data (b/o. PR1 Comparative Report, 2023)

2. Methodology

The research approach combined quantitative (student survey) and qualitative (focus groups) methods. The investigated variables are in line with those agreed on in the NIILS application (2021, p.56 et seq.). The NIILS survey and focus groups primarily investigated the knowledge and use of ILS among students at NIILS partner universities. Hence, the survey as well as focus groups were conducted in German, Turkish, Lithuanian, and Italian as well as partially in English. Table 2 and Figure 1 outline the variables included in the survey and/or in the focus groups. Further information regarding the variables and the procedure is described in the next chapter. The survey is documented in Appendix 1. The interview guides for the student and lecturer focus groups are documented in Appendix 2.1 and 2.2.

The report is structured as follows:

1. First, the descriptive results of the student survey conducted in all partner universities are outlined (chapter 3.1. Descriptive analysis).

2. Secondly, the corresponding overall hypotheses testing results as part of the student surveys are presented (chapter 3.2 Hypotheses testing).

3. Thirdly, key findings of the conducted students' and lecturers' focus groups at all partner universities are summarized from a meta perspective (chapter 4 Focus group interviews).

2.1. Survey and focus group variables

In the following, the research approach, specifically focusing on the use of survey and focus group variables to gather and analyze data will be discussed. The quantitative survey and qualitative focus groups were aligned with the included topics. The quantitative survey was conducted to get a broad picture of ILS and the perceptions of students in the five countries. The qualitative focus groups were used to get an in-depth analysis of the topics. The variables were conceptualized in an input – process – output model. The central input variables (independent variables) were availability and accessibility of ILS. The central output variables (dependent variables) were social integration, affective commitment, well-being and satisfaction with campus. In our research approach we aimed to detect if and how availability and accessibility of ILS influence positive outcomes, e.g. social integration or well-being. The research approach and variables included in the survey and focus groups are shown in Table 2.

Table 2. Research approach and variables included in the survey and focus groups

Survey (quantitative method)	Focus Groups (qualitative method)
a) **Availability, accessibility**, spatial characteristics, equipment and use of **informal** or nonconventional **learning spaces by different student groups** (independent variables)	
• (Self-developed scale for availability and accessibility)	• In-depth analysis of perceived availability and accessibility of ILS
b) Analyzing and categorization of users' perceptions and experiences regarding the **fit of learning strategies and learning spaces**	
• Scales differentiate between focused and collaborative learning	• In-depth analysis of focused and collaborative learning environments
c) **Impact** of the used informal or non-conventional learning spaces on **students' social integration, affective commitment, well-being, satisfaction with campus and knowledge acquisition** (dependent variables)	
• **Social integration** (French & Oakes, 2004) • **Affective commitment (sense of belonging)** measured with the scale of affective commitment to the university (Allen and Meyer, 1990) • **Well-being:** WHO-5 Well-Being Index (Topp, Oestergaard, Soendergaard & Bech, 2015) • **Satisfaction** with campus and knowledge acquisition (self-developed scale)	• In-depth analysis of satisfaction with the support and the learning environment
d) Existing **inequalities and barriers** related to informal or non-conventional learning spaces, including access to technical equipment and internet as well as to physical-spatial environments conducive to learning and well-being (self-developed items for barriers)	
	e) **Students' and lecturers' awareness and enabling strategies** to deal with existing inequalities and barriers • Future scenarios regarding hybrid learning and technological support

2.2.   Procedure

The survey was developed in English and translated in the language of the respective country. We aimed at a sample size of 1.000 students in all five partner countries, meaning 200 students per each university. Bigger universities (AKD, SAP and HTW) were asked to strive for a slightly larger sample size compared with smaller universities (MRU and UWK). This sample size does not allow to give a representative picture, but it allows to test the hypotheses (according to the optimal n described by Cohen (1988). The survey was mostly digitally provided. The login was enabled via e-mail or QR-Code. Partners acquired students using flyers, posters, newsletters and circular emails. Students were also invited to participate by personal communication, e.g. in classes of the participating researchers. They also were asked to forward the link to other befriended students.

For the focus groups the information was spread via e-mail and personal communication. Most lecturers were directly invited to participate in the focus groups because they were colleagues of the participating researchers. Students were acquired using word-of-mouth communication and invitations in the classes.

In the next chapter sample characteristics are described. Moreover, items and scales are described in detail. They are presented in combination with descriptive results.

3. Student survey: thematic structure

Figure 1 below outlines the thematic structure of the student survey, whose findings will be discussed in the following chapters. Structured into six sections, the survey took approximately 20 minutes to complete and included single and multiple-choice questions, Likert scales, and open-ended responses. It targeted all students at partner universities and utilized the survey tool Unipark for deployment and data management. The survey was promoted through university lectures, faculty, and various marketing materials, which directed participants to an online survey link. Data were anonymized and analyzed using Excel and SPSS.

1. Sociodemographic Data
(i.e. age, gender, fewer opportunities)

2. Questions about Studies
(i.e. study model, BA/MA, full- vs. part-time)

3. Focused Learning Activities
(i.e. use of places, availability, accessibility, barriers, satisfaction)

4. Collaborative Learning Activities
(i.e. use of places, availability, accessibility, barriers, satisfaction)

5. Hybrid Learning Activities
(i.e. availability of technological devices, virtual places, barriers)

6. University Campus
(i.e. social integration, affective commitment, well-being, satisfaction with campus

Figure 1. Thematic structure of the survey

3.1. Descriptive analysis

Firstly, the collected data of all participating partner universities was transferred from Unipark into an SPSS-file. We added all variable names and questions out of the survey as well as the answering categories for every item into the SPSS file. We checked for missing data and set up the correct scale levels. Coding for most items was aligned and coded in the same direction (e.g. fully agree = 5, fully disagree = 1).

For the central independent variables (availability, accessibility, satisfaction with focused and collaborative learning environments) and central dependent variables (social integration, affective commitment, well-being and satisfaction with campus) we conducted an item and scale analysis and created scales (see chapter 3.1.6. and Appendix 1.2).

In the **item analysis** every item was checked for the following criteria:

- **Mean** between **1,8 and 4,2** (to prevent floor and ceiling effects for five-point Likert scale, all scales except Well-being). Well-being is a **six-point Likert-scale** coded between 0 – 5, the **mean** has to be between **1 and 4** to prevent floor and ceiling effects.
- **Normal distribution**: checked by visual inspection.
- **Corrected item-total-correlation**: between **0,30 and 0,80.**

In the **scale analysis** the reliability was measured via **Cronbach´s alpha**. It should be **at least 0,70**.

In the subsequent chapter the descriptive analysis will be presented. First, the sample will be described according to the socio-demographic and the questions about studies. Afterwards, the independent variables such as, availability, accessibility and satisfaction for focused and

collaborative learning are presented. Then, dependent variables, namely social integration, affective commitment, well-being and satisfaction with campus will be depicted in detail. Refer to the comprehensive table displaying the item and scale analysis for all universities in Appendix 1.2.1 for more details.

3.1.1. Sample (sociodemographic data)

A total of **n = 1037** students at all five partner universities took part in the online survey between May and July 2022. At this, sample size may vary slightly among questions, since not every question was mandatory and answered by every participant.

Regarding the gender, 58% of the participants were female and 39% of the participants were male students. The remaining students chose the options "diverse", "prefer not to say" or skipped this question. Around half of the students were between 21 – 25 years old (54%). About 20% were up to 20 years and 26% were older than 26 years. 15% stated that they are living in a household with minor children or persons in need of care, which fits to the young sample of participants who are predominantly in the beginning of their twenties.

The living situation is very diverse (see Figure 2). Most of the students stated to either live at their parents´ or relatives´ house (27%) or in student dormitories (25%). A fair number of students also either share a flat with others or live with their partner (each 17%).
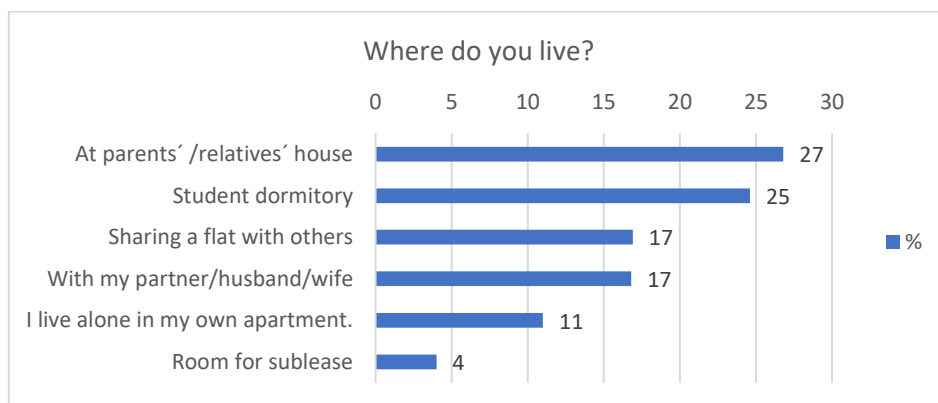
Figure 2. Living situation (n = 1037)

In addition, also the living situation among students differs strongly across the partner universities. UWK students predominantly reside with their partners, while AKD students primarily live in student dormitories. SAP mostly reside with their parents or relatives. MRU and HTW students typically live with their parents, relatives, or share flats. The differences in living situations are assumed to have demographic (i.e., UWK), economic (i.e., AKD), and cultural (i.e., SAP) reasons (for more information refer to Appendix 1.1.1).

Students stated a lot of personal challenges (see Figure 3). The most prominent ones are the "need to work for living while studying" (35%) and "financial obstacles" (26%). In addition, 20% report to suffer from "mental diseases". Every other challenge is experienced between 3% to 10% of the participants. 30% report to experience "none of these" challenges. If students faced at least one personal challenge listed in Figure 3, they are considered to be a student with fewer opportunity (SWFO) in this study.
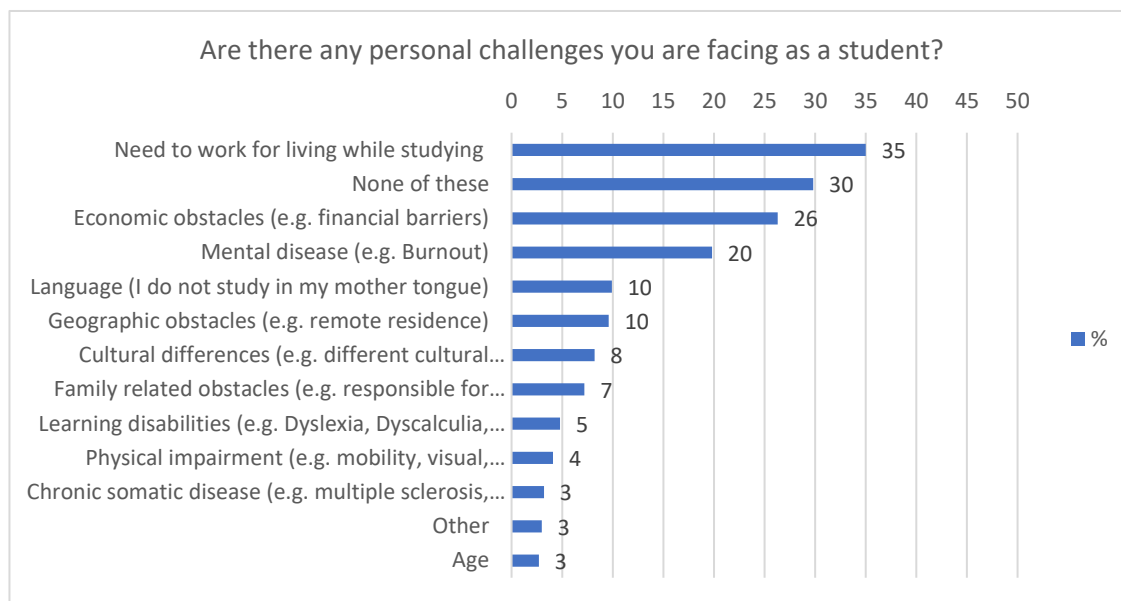
Figure 3. Personal challenges of SWO (n = 1037)

When we examine the challenges faced by students across our partner universities, we see differences between the countries. It becomes apparent that those at UWK need to balance work alongside their studies more extensively. They also encounter family-related obstacles more frequently compared to students at other universities. This trend is likely attributed to UWK's work-accompanying study program and the relatively older demographic of UWK students. Moreover, it is noticeable that a significant number of HTW and MRU students also work while pursuing full-time studies, although the underlying reasons for this have not been thoroughly investigated.

In contrast, students at AKD notably report economic challenges and mental health issues to a greater degree than students at other partner universities. These challenges are assumed to stem from the economic, immigration and political situation in Turkey during the time of our survey. The students surveyed at SAP appear to encounter these challenges to a lesser degree in comparison to students from our partner universities. Hence, overall, the personal challenges of SWFO across partner universities differ (for more information refer to Appendix 1.1.2).

3.1.2. Questions about studies

Regarding the "distance to university" most students live nearby and only commute between 0 – 4 km (32%), followed by 5 – 10 km (28%) to the campus. Around 20% live between 11 to 30 km away, whereas the remaining students (20%) live more than 30 km away.

62% of participants are enrolled in a Bachelor´s degree, 30% are enrolled in a Master´s degree, while only a minority (8%) are enrolled in other degrees (Ph.D., Associate degree). Most of the students study full-time (82%) and in presence on campus (61%). 26% of the students study part-time with regular attendance phases at the campus, whereas the remaining students are in distance learning programs (with and without presence offers, 11%). Accordingly, students were enrolled mostly in their study programmes 2021 (35%), 2020 (23%) or 2019 (16%).

Respectively, most students state to spend about 21-30 hours per week on their studies (19.5%). On the contrary, 17.5% of students only spend 5 hours or less and around 17% spend between 6-10 hours on their studies per week. 17% of the students spend between 11-15 hours per week, whereas around 15% study between 16-20 hours per week. Only the minority of students (14%) studies more than 30 hours per week. Please notice that the surveyed students studied in different study models as mentioned above.

There are two prominent fields of study in this sample (see Figure 4). Students across the partner universities mostly study "Engineering, Manufacturing and Construction" (22%) and "Business, Administration and Law" (22%).
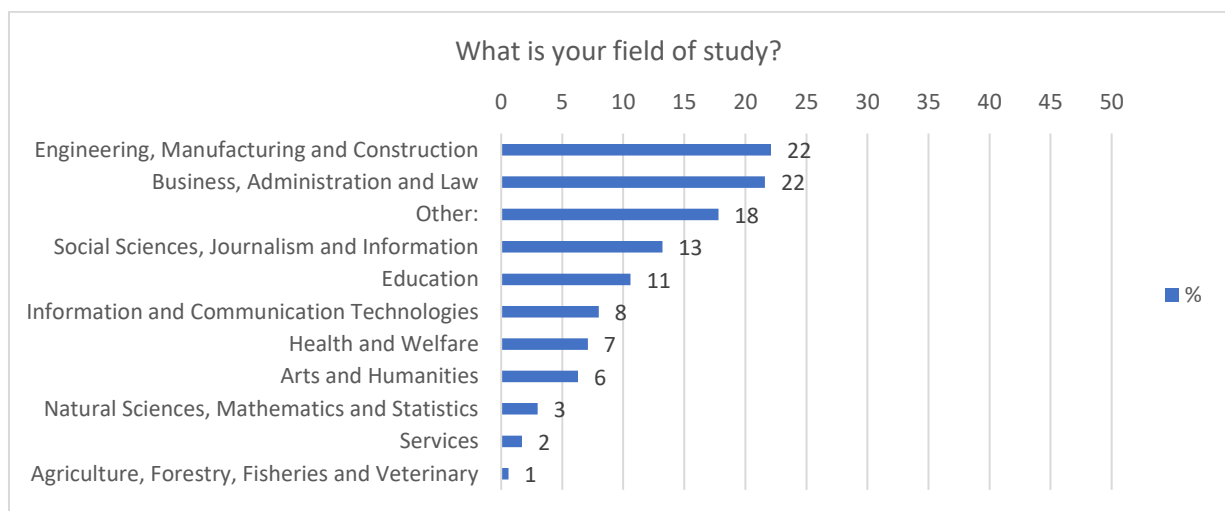
Figure 4. Field of study (n = 1037)

3.1.3. Focused learning activities

Students were asked at which places they conduct focused learning activities (see Figure 5). The most prominent place to conduct focused learning (FL) is by far "the place where I live" (mean = 4.1), according to students. Further, "seminar rooms" and the "university library" (both mean = 2.5). Any other places are less mentioned for focus learning.
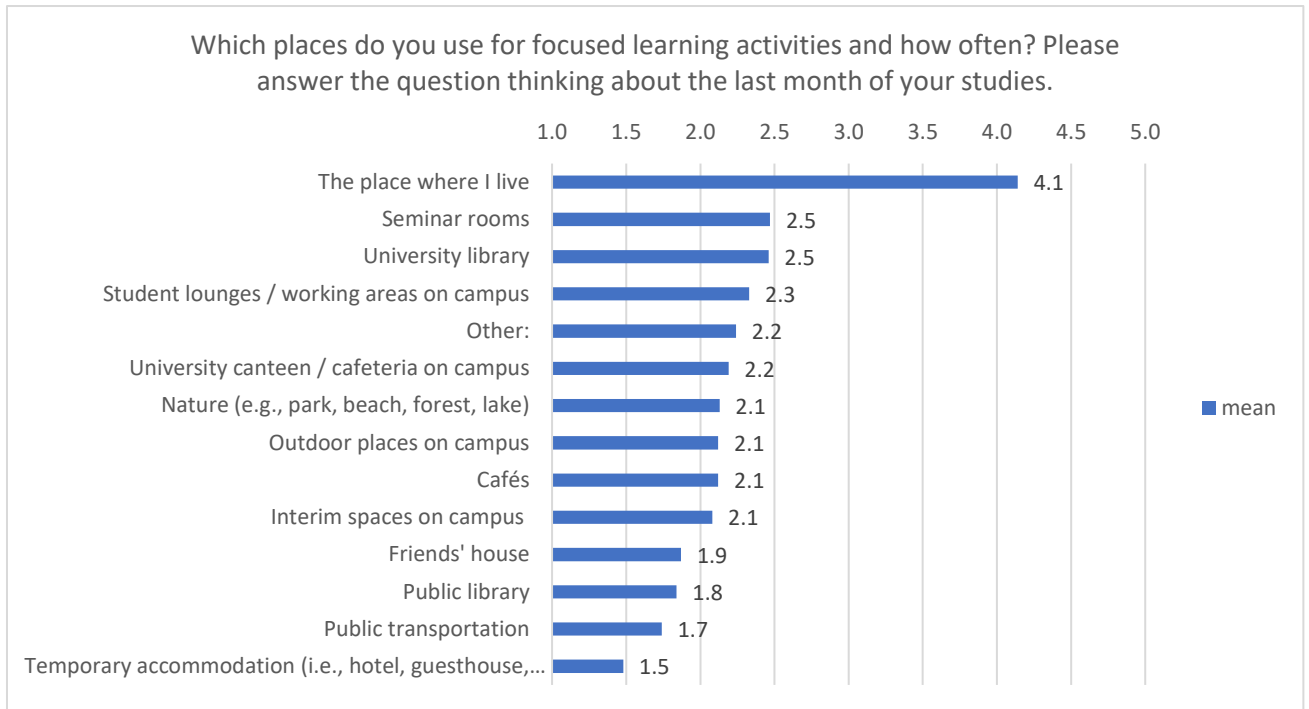
Figure 5. Places used for focused learning activities (n = 1037)

Notes: 1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = very often

When examining data from each partner university, numerous similarities emerge in the spaces chosen by European students for informal FL. Remarkably, outdoor spaces are nearly equally favoured, as observed in both MRU in Lithuania and AKD in Turkey. This raises the intriguing question of whether climatic differences hold any relevance in these preferences at all (for more information refer to Appendix 1.1.3).

Table 3 displays the self-developed scales used to evaluate availability, accessibility, and satisfaction with spaces designated for focused and collaborative learning. All items were administered using a five-point Likert scale (ranging from 1 = totally disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = totally agree). Additionally, the survey included separate questions about the obstacles to use focused and collaborative learning spaces (see Appendix 1).

Table 3. Self-developed scales for student survey

Scale name (six-point Likert scale)		Self-developed item
Availability: places for focused learning activities	1	If I want to study on my own, I know where I can go in my university.
	2	There is the opportunity to study on my own at the campus of my university.
	3	There are enough places for focused learning activities at my university.
Accessibility: places for focused learning activities	1	Places for focused learning activities are open to all students at my university.
	2	Places for focused learning activities are easily accessible at my university.
	3	If I want to study on my own, I can find a place at my university at short notice.
	4	I can reach learning places for focused learning activities without any barrier.
Satisfaction: places for focused learning activities	1	I am satisfied with the places for focused learning activities on the campus of my university.
	2	I feel comfortable at places for focused learning activities on the campus of my university.
Availability: places for collaborative learning activities	1	If I want to study together with my fellow students, I know where I can go in my university.
	2	There is the opportunity to study together in groups with other students at the campus of my university.
	3	There are enough places for studying in groups on campus of my university.
Accessibility: places for collaborative learning activities	1	Places for studying in groups are open to all students at my university.
	2	Places for studying in groups are easily accessible at my university.
	3	If we want to study in groups, we can find a place at my university at short notice.
	4	I can reach learning places for collaborative learning activities without any barrier.
Satisfaction: places for collaborative learnin activities	1	I am satisfied with the places for collaborative learning activities on the campus of my university.
	2	I feel comfortable at places for collaborative learning activities on the campus of my university.

Table 4 depicts the item and scale analysis for availability, accessibility and satisfaction for focused learning activities. There are no floor and ceiling effects. Visual inspection supports normal distribution assumption. Corrected item-total-correlation are mainly satisfying. Since reliability coefficients are satisfying we included all items as planned to construct the scales. Table 4 also shows the descriptive statistics of scales. Students were asked to rate the availability and accessibility of FL spaces. For focused learning spaces, accessibility is slightly better rated (mean = 3.54) than availability (mean = 3.47; see Table 4).

Table 4. Item and scale analysis and descriptive statistics for FL activities

Item and scale analysis						Descriptive statistics of scales	
Name of scale	Number of items	No floor and ceiling effects	Normal distribution	Corrected Item-total-correlation	Reliability of scale (Cronbach's Alpha)	Mean	SD
FL_Availability	3	ok	ok	ok	0.82	3.47	0.997
FL_Accessibility	4	ok	ok	Ok, except FL_AC_2 0.81, alpha without FL_AC_2 0.79, accepted	0.87	3.54	0.901
FL_Satisfaction	2	ok	ok	ok	0.83	3.33	0.991

Notes: 1 = totally disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = totally agree

Students report many obstacles regarding FL activities (multiple selection was possible). "Limited availability (e.g. too crowded)" (59%) and "opening hours" (54%) were reported to be the main obstacles to use focused ILS students face. Obstacles concerning registration (15%), difficulties in accessing (10%) or others (9%) are less mentioned (see Figure 6).
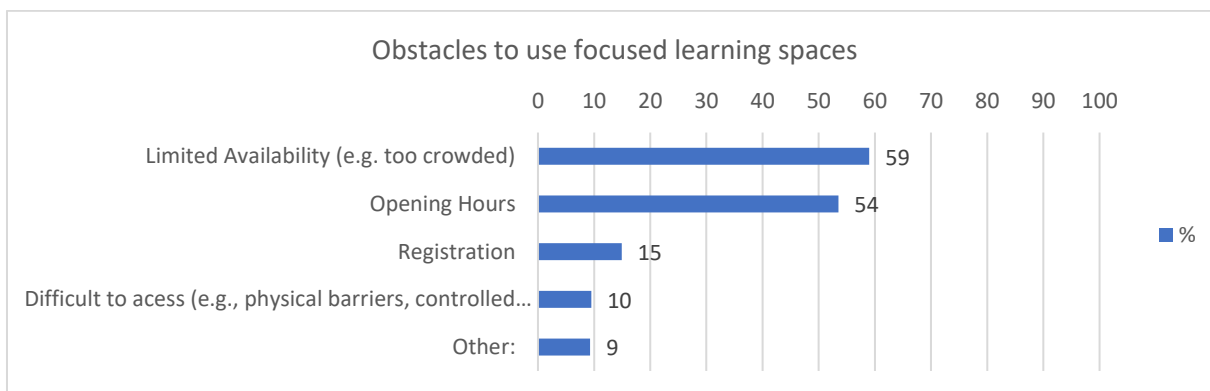
Figure 6. Obstacles to use focused learning activities (n = 1037)

Looking at the obstacles regarding FL activities we see mainly similarities between the countries. Students at most partner universities (AKD, HTW, SAP, UWK) face a prevalent obstacle of limited availability when it comes to using focused ILS on campuses, while MRU students encounter their major challenge with the unsuitability of opening hours for these spaces. All in all, results indicate similarities concerning obstacles across partner universities (for more information refer to Appendix 1.1.4).

3.1.4.   Collaborative learning activities

Students were asked which places they use to conduct collaborative learning (CL) activities (see Figure 7). Compared to FL activities the ranking is similar. Like for FL, studying at home is

also popular for CL. Students seem to prefer gathering privately at the places where they live to study together (CL mean = 3.24) but those places are still comparably used more often for FL (FL mean = 4.1). Students also often use "seminar rooms" (mean = 2.65) as well as "other places" (mean = 2.44) for CL. Moreover, the library is chosen more often for FL activities than for CL activities.
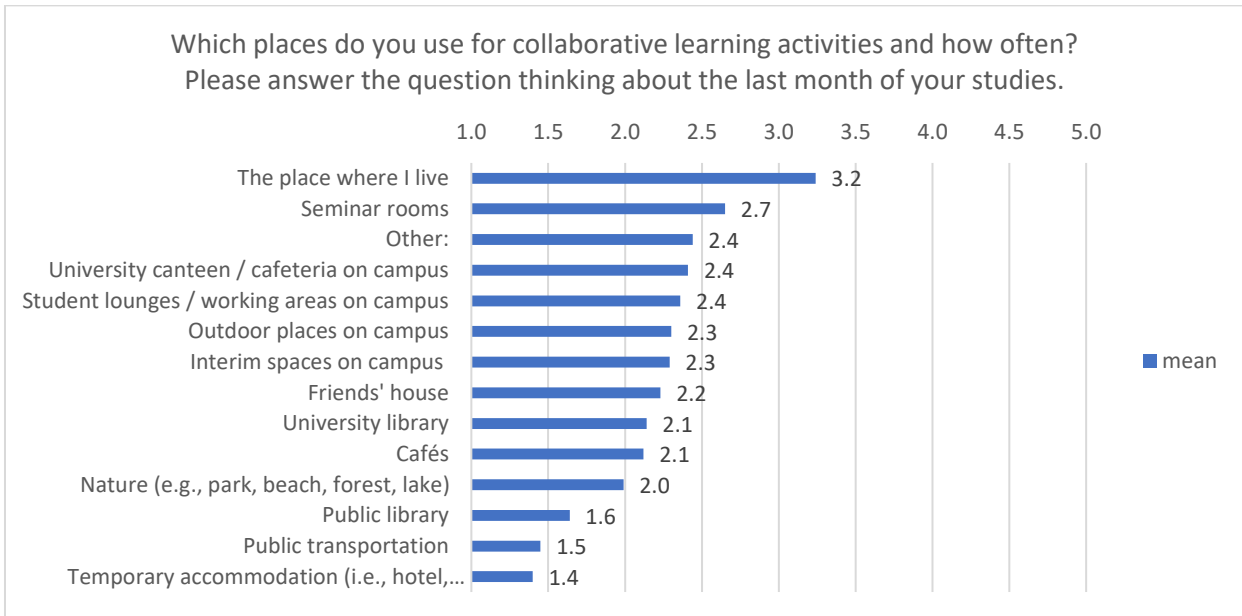
Figure 7. Places used for collaborative learning activities (n = 1037)

Notes: 1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = very often

When examining data from each partner university, numerous similarities emerge when students choose informal spaces for CL. Overall, students across partner universities share similar preferences for informal CL spaces, much like those used for FL activities (in terms of preferability, independence of climate). Yet, MRU students notably favour the library as an ILS (for more information refer to Appendix 1.1.5).

In addition, the item and scale analyses were conducted, whereof results are presented in Table 5 (for more information refer to Appendix 1.2). Overall, there are no floor and ceiling effects. Visual inspection supports normal distribution assumption. Corrected item-total-correlation are mainly satisfying, one item in each scale of CL_Availability and CL_Accessibility shows slightly too high corrected item-total-correlations. Since the scales maintain good reliability (according to Cronbach´s Alpha), we included all items as planned to construct the scales. In Table 5 also descriptive statistics of scales can be found. Students were asked to rate the availability and accessibility of CL spaces. Similar to focused ILS, the accessibility is slightly better rated (mean = 3.43) than the availability (mean = 3.32) regarding spaces to conduct CL activities.

Table 5. Item and scale analysis and descriptive statistics for CL activities

	Item and scale analysis					Descriptive statistics of scales	
Name of scale	Number of items	No floor and ceiling effects	Normal distribution	Corrected Item-total-correlation	Reliability of scale (Cronbach's Alpha)	Mean	SD
CL_Availability	3	ok	ok	Ok, except CL_AV_2 0.81, alpha without FL_AV_2 0.78, accepted	0.82	3.32	1.004
CL_Accessibility	4	ok	ok	Ok, except CL_AC_2 0.84, alpha without CL_AC_2 0.84, accepted	0.87	3.43	0.944
CL_Satisfaction	2	ok	ok	ok	0.83	3.33	1.004

Notes: 1 = totally disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = totally

Like in focused ILS, students report a great deal of obstacles regarding spaces CL activities (see Figure 8), with 60% stating "limited availability (e.g. too crowded)" as an obstacle. About 48% perceive the "opening hours" as a barrier to use CL spaces. "Registration" (17%), difficulties in accessing (11%) or others (9%) are less mentioned. These percentages are very similar to the obstacles reported for spaces to conduct FL activities.
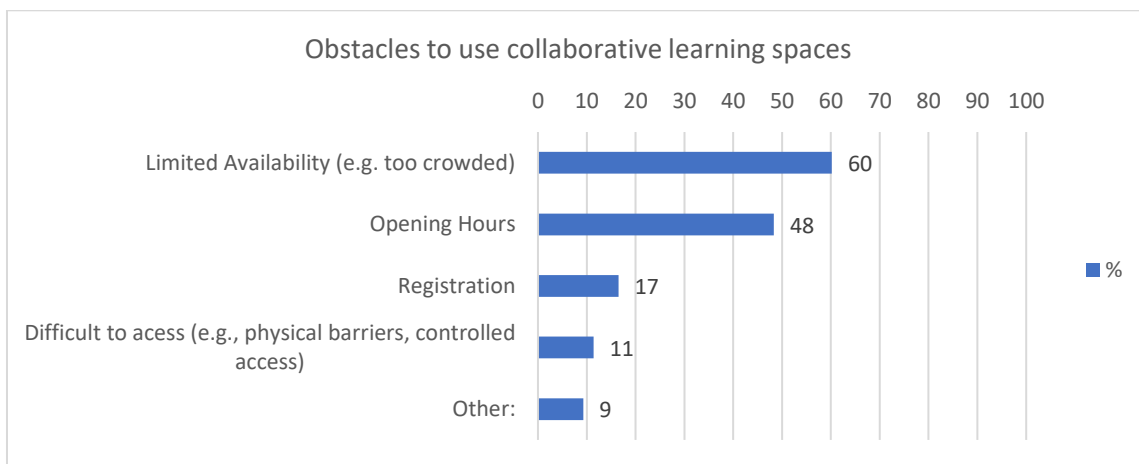
Figure 8. Obstacles to use collaborative learning activities (n = 1037)

Comparing the results for the different partner universities, we see many similarities. Similar to the challenges faced in accessing FL spaces, students at the majority of partner universities (AKD, HTW, SAP, UWK) encounter a common obstacle of restricted availability when attempting to use collaborative ILS on campuses. In contrast, MRU students grapple primarily with the issue of unsuitable opening hours for these spaces (for more information refer to Appendix 1.1.6).

3.1.5. Hybrid learning activities

Students were asked about the devices they have available for their studies. About 88% of the students surveyed state that they have a laptop/notebook/netbook, 86% have a smartphone and 28% have a tablet. E-book reader (5%) or other devices (1%) are less mentioned.

About 68% of the students surveyed state that they have access to WIFI on campus and slightly more than half of the surveyed students state that they are largely satisfied with the WIFI quality (54% agree - totally agree). 21% of the students are neither satisfied nor dissatisfied, whereas surprising 26% are dissatisfied with the WIFI quality.

When it comes to using virtual spaces for studying, students predominantly use "messenger services, i.e. WhatsApp" (44%), "learning management systems, i.e. Moodle" (28%), "video communication, i.e. Zoom" and "online document management platforms, i.e. Google Docs" (each 25%), whereas some students use social media (20%) as a virtual space for studying. Online forums, online chats and augmented/virtual reality are less mentioned.

The top three of technological obstacles are with 45% the "lack of infrastructure (e.g. availability of plugs)", "lack of technological support (23%), and 20% "outdated technology" to use the provided technologies appropriately. For the variables regarding hybrid learning activities we see similarities, but also differences between our partner countries. Details are documented in the individual partner reports.

3.1.6. Development of dependent variables

To measure the effects of availability and accessibility of ILS we included dependent variables. These are (1) social integration, (2) affective commitment, (3) well-being and (4) satisfaction with campus. In the following the development of the scales is presented.

3.1.6.1. Social integration

In informal learning spaces students interact, establish a network and support each other. These interpersonal relationships are known as social integration. Social integration leads to the establishment of relationships and enhances similar attitudes and values to personal development (cf. Berger & Milem, 1999). In the"Student integration model" Tinto (1975) proves that social integration is a core factor in preventing dropout of students. Numerous studies show that the lack of academic and social integration leads to higher dropout rates of students (cf. Tinto, 1975; Bers & Smith, 1991; Klein, 2019).

Social integration is a well-defined construct with an existing scale. French and Oaks (2004) show evidence for satisfying reliability and validity for the social integration scale. Also, Klein (2019) use the scale in a German sample and find satisfying results in factor analyses and reliability. Based on Pascarella and Terenzini (1980) and French and Oaks (2004), Paine (2008) defined items with direct reference to social integration in the student setting, while grouping these items as Peer Group Interaction items. Based on these results, we decided to use six

items of this scale and excluded the four items due to time constraints in the survey. In Table 6, items for the Social Integration Scale, specifically for Peer Group Interactions, are listed. All items were administered using a five-point Likert scale (ranging from 1 = totally disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = totally agree).

Table 6. Comparison: original and revised scale items for the Social Integration Scale

Scale type & source		Original item	Revised item (student survey)
Social Integration - Peer Group Interactions (Paine, 2008; Pascarella & Terenzini, 1980; French & Oakes, 2004)	1	My interpersonal relationships with students have positively influenced my intellectual growth and interest in ideas.	Unchanged
	2	I have developed close personal relationships with other students.	Unchanged
	3	The student friendships I have developed have been personally satisfying.	Unchanged
	4	My personal relationships with other students have positively influenced my personal growth, values, and attitudes.	Unchanged
	5	It has been easy for me to meet and make friends with students.	Unchanged
	-	I am satisfied with my dating relationships.	Excluded
	-	Many students I know would be willing to listen and help me if I had a personal problem.	Excluded
	6	Most students at this university have values and attitudes similar to mine.	Unchanged
	-	I am satisfied with the opportunities to partici-pate in organized extra curricular activities at this university.	Excluded
	-	I am happy with my living/residence arrange-ment.	Excluded

3.1.6.2.   Affective commitment

We assume that available and accessible ILS will increase social integration of student. In turn, social integration supports further positive consequences like commitment, sense of belong-ing to and identification with the university. While these variables are slightly different defined, they all focus on psychological attachment to an organization based on experiences with mem-bers of the organization. There are differences in the field of research: commitment as a meas-ure to assess employees' attachment to the organization is widely used in organizational psy-chology, sense of belonging is common in educational research.

According to the three-component model of commitment developed by Meyer et al. (1993) three forms of commitment can be distinguished:

(1) affective commitment: emotional ties developed via positive work experiences,

(2) normative commitment: perceived obligation towards the organization and

(3) continuance commitment: based on the perceived costs, both economic and social, of leaving the organization.

This model of commitment has been used by researchers to predict important employee outcomes, including turnover and citizenship behaviors, job performance, absenteeism, and tardiness (Meyer et al., 2002). A meta-analysis shows that out of the three dimensions affective commitment has the strongest relationships to intent to leave and actual turnover (Meyer et al., 2002). Also, out of the three dimensions the concept of affective commitment has the biggest overlap to sense of belonging. Both focus on emotional ties based on interpersonal interactions with members of the organizations. Davila and Jimenez Garcia (2012) studied the relationship between affective commitment and sense of belonging. They show a significant empirical relationship between the two constructs, although they possess discriminant validity. Since the "affective commitment scale" proposed by Allen and Meyer (1990) shows satisfying reliability and validity in numerous studies (Meyer & Allen, 2002; Riketta, 2005), we decided to use this scale to measure perceived attachment of students to their university. In Table 7 the original items and the items used in the survey are outlined. All items were administered using a utilizing five-point Likert scale (ranging from 1 = totally disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = totally agree). Please note that some items (marked with an (R) were reversely coded before constructing the scale. Ultimately, means can be interpreted like this: the higher the mean the higher the perceived affective commitment of students.

Table 7. Comparison: original and revised scale items for the Affective Commitment Scale

Scale type & source		Original item	Revised item (student survey)
Affective commitment scale (Allen and Meyer, 1990)	1	I would be very happy to spend the rest of my career with this organization.	I would be happy to pursue another degree at my university.
	-	I enjoy discussing about my organization with people outside it.	Item excluded, because it is difficult to transfer it to the university context
	-	I really feel as if this organization´s problems are my own.	Item excluded, because it is difficult to transfer it to the university context
	2	I think that I could easily become as attached to another organization as I am to this one. (R)	I think that I could easily become as attached to another university as I am to this one. (R)
	3	I do not feel like 'part of the family' at my organization. (R)	I do not feel like 'part of the family' at my university. (R)
	4	I do not feel 'emotionally attached' to this organization. (R)	I do not feel 'emotionally attached' to this university. (R)
	5	This organization has a great deal of personal meaning for me.	This university has a great deal of personal meaning for me.
	6	I do not feel a 'strong' sense of belonging to my organization. (R)	I feel a 'strong' sense of belonging to my university.

3.1.6.3.   Well-being

The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2020; S. 1). This salutogenetic perspective on health focuses not only physical aspects, but also on psychological aspects, like enjoyment, happiness and satisfaction with life. Human beings should not only be free of illnesses, but they also have a fundamental right to self-determination and enjoying their life. The concept of well-being encompasses two facets: (1) hedonic well-being: delight, joy, happiness which is expressed in high positive and low negative affect, high vigor and low exhaustion as well as satisfaction with life) and (2) eudaimonic well-being: perception of self-determination (according to Ryan & Deci, 2001) and striving for goals which are in line with own values (Tov, 2018). For an overview of the concept of well-being see Sonnentag et al. (2023). Well-being and psychic health are of utmost importance. Nevertheless, studies show an increasing number of psychic illnesses, mostly depression and burnout. Affected are employees, but also students and pupils (numbers for Germany are depicted in BKK, 2022, Kroher et al, 2021, 22. Sozialerhebung des BMBF).

There exist numerous scales to measure well-being (for an overview see Sonnentag et al., 2023), e.g. PANAS (Positive and Negative Affect Scale), SWLS (Satisfaction with Life Scale), MBI (Maslach Burnout Inventory) and JDS (Job Diagnostic Survey). The WHO 5-item index is widely used as a screening instrument. It encompasses five items (e.g. perceptions of joy, vigour and meaningfulness of actions), which are related to the two facets of well-being. Participants are asked to indicate for each of the five statements how they have been feeling over the past 2 weeks using a scale ranging from 5 = All of the time, 4 = most of the time, 3 = more than half the time, 2 = less than half the time, 1 = some of the time and 0 = at no time. Answers are summarized and multiplied with 4. By this a sum score is calculated which ranges between 0 (no well-being) and 100 (highest well-being). The index is used several studies, so the score can be compared with different samples. For example, the European Quality of Life Survey 2016 came up with a score of 65 for Germany (Eurofound, 2018).

The WHO-5-item index is very well developed and shows good quality criteria. Interpretation objectivity is high: scores can be interpreted as followed: scores > 50 no depression, scores between 30 – 50 slight depression und scores < 30 medium depression (Blom et al., 2012). Reliability is high (e.g. in a German sample with n = 2.456. Brähler et al. (2007) used Cronbachs Alpha and split-half-reliability. Several studies support the validity of the WHO-5-item index as a sensitive and specific screening instrument for depression and a valid predictor for burnout (Blom et al., 2012; Krieger et al., 2014; Topp et al., 2015). Therefore, we decided to use this scale shown in Table 8.

Table 8. Comparison: original and revised scale items for the Well-Being Scale

Scale type & source		Original item	Revised item (student survey)
Well-Being (Topp et al., 2015)	1	I have felt cheerful and in good spirits	Unchanged
	2	I have felt calm and relaxed	Unchanged
	3	I have felt active and vigorous	Unchanged
	4	I woke up feeling fresh and rested	Unchanged
	5	My daily life has been filled with things that interest me	Unchanged

3.1.6.4.   Satisfaction with campus

Satisfaction with products and services is one of the most central dependent variables. Asking students about the ILS at their university, we wanted to include a measure of satisfaction with campus in general. We did not find an existing scale, so we developed an own scale. In this scale different aspects of satisfaction are included: emotional satisfaction (satisfaction with atmosphere and comfort), cognitive satisfaction (satisfaction with knowledge acquisition, e.g. study support, motivation to study) and intent to recommend the university to other students. The last item was inspired by customer satisfaction, where intent to recommend the product or service is proven to be a good indicator of satisfaction. In Table 9, the items for the dependent variable "satisfaction with university campus" are depicted. All items were administered using a utilizing five-point Likert scale (ranging from 1 = totally disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = totally agree).

Table 9. Satisfaction with university campus (self-developed scale)

Scale name (six-point Likert Scale)		Self-developed items
Satisfaction: university campus	1	I like to study at the campus of my university.
	2	I like the atmosphere at the university campus.
	3	I feel comfortable at places for learning activities on the campus of my university.
	4	I think the places for students at my university support studying.
	5	The places for studying in my university motivate me to study more.
	6	I would recommend my university to other students.
	7	Other + text

To test the quality criteria in of the dependent variables in our sample we conducted an item and scale analysis. The item and scale analysis for social integration, affective commitment, well-being and satisfaction with campus is depicted in Table 10. There are no floor and ceiling

effects. Visual inspection supports normal distribution assumption. Corrected item-total-cor-relation are mainly satisfying. However, with a value of 0.13 item 2 in the affective commit-ment scale violated the corrected item-total-correlation criteria and led to a substantially de-creased reliability of the scale. Therefore, we decided to exclude item 2 and built up a 5-item scale which showed satisfying reliability. For the other scales we included all items as planned to construct the scales. In Table 10 also descriptive statistics (means and standard deviations) of scales can be found (for more details see Appendix 1.2.1).

Table 10. Item and scale analysis and descriptive statistics for dependent variables

Item and scale analysis						Descriptive sta-tistics of scales	
Name of scale	Number of items	No floor and ceil-ing ef-fects	Normal distribu-tion	Corrected Item-to-tal-correlation	Reliability of scale (Cronbach's Alpha)	Mean	SD
Social integra-tion	6	ok	ok	ok	0.89	3.61	0.87
Affective com-mitment	6	ok	ok	Ok, except item 2, alpha without item 2 = 0.80, new scale except item 2	0.76 (6 item scale) 0.80 (5 item scale)	3.14	0.84
Well-being	5	ok	ok	ok	0.89	51.73	22.72
Satisfaction with campus	6	ok	ok	ok	0.89	3.58	0.83

Notes: Satisfaction, affective commitment, social integration: 1 = totally disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = totally agree; well-being: 0 worst well-being – 100 best well-being, a cut-off score of ≤ 50 is used to assign a 'screening diagnosis' of depression.

3.1.7. Summary of descriptive results

The demographics vary significantly among the different samples from each partner univer-sity. Overall, over half of the sample (total sample size: n= 1037) comprises females, predom-inantly young adults aged between 21 and 25. The sample of UWK is slightly older. We see differences when we look at the places students live, residing in student dormitories (AKD), live with their partners/husbands/wives (UWK), live with their parents or relatives (SAP), or live with their partners (UWK). Many students face challenges of balancing work and studies. Unexpectedly, a high percentage (20%) reported suffering from mental health issues. Some students live close to campus, while others have lengthy commutes. Most participants are pursuing their bachelor's degrees full-time, attending lectures and seminars in person. Study hours per week vary widely, with engineering, business, administration, and law being the predominant fields of study.

Although the samples across the partner universities differ extensively, yet there are profound similarities concerning the selection and use of ILS, their perceived availability and accessibility, as well as perceived obstacles of using ILS on campuses. FL predominantly occurs at home, while collaborative learning is conducted in a diverse set of places. "Seminar rooms" stand out as primary spaces for focused and collaborative learning activities, while in the context of FL, the "library" and "student lounges / working areas" also hold significant prominence. Data from each partner university reveal numerous similarities in European students' choices for informal FL and CL spaces. Surprisingly, outdoor spaces are nearly equally favoured despite of different climates, evident in both MRU in Lithuania and AKD in Turkey. Limited availability of spaces (e.g., overcrowding) or unsuitable opening hours are the predominant obstacles to informal focused and collaborative ILS.

3.2.   Hypotheses testing

The hypotheses testing describes the impact of the used informal or non-conventional learning spaces on students' affective commitment, social integration, well-being and university campus satisfaction.

3.2.1.   Hypotheses 1a, 1b, 1c and 1d

The following hypotheses have been formulated to investigate the impact of ILS on various aspects of the student experience at university:

Hypothesis 1a: The higher the availability and accessibility of informal learning spaces on campus, the higher the affective commitment of students.

Hypothesis 1b: The higher the availability and accessibility of informal learning spaces on campus, the higher social integration of students.

Hypothesis 1c: The higher the availability and accessibility of informal learning spaces on campus, the higher the well-being of students.

Hypothesis 1d: The higher the availability and accessibility of informal learning spaces on campus, the higher the satisfaction of students with the university campus.

Table 11. Results of hypotheses 1a, 1b, 1c and 1d

	Affective Commitment	Social Integration	Well-Being	University Campus Satisfaction
Availability	r = 0.27 p < 0.001	r = 0.27 p < 0.001	r = 0.27 p < 0.001	r = 0.55 p < 0.001
Accessibility	r = 0.29 p < 0.001	r = 0.29 p < 0.001	r = 0.28 p < 0.001	r = 0.57 p < 0.001

Table 11 shows the results of hypotheses 1a, 1b, 1c and 1d, which are supported. The All requirements are fulfilled: The higher the availability and accessibility of ILS on campus, the higher affective commitment (1a), social integration (1b), well-being (1c) and satisfaction with campus (1d).

The correlation coefficients reveal significant relationships between various factors. Affective commitment, social integration, and well-being display weak positive links with the availability and accessibility of university spaces. Higher perceptions of availability and accessibility correspond to stronger feelings of integration, better relationships, and enhanced well-being among respondents.

Notably, University Campus Satisfaction demonstrates a notably stronger positive correlation with both Availability ($r = 0.55$, $p < 0.001$) and Accessibility ($r = 0.57$, $p < 0.001$). This underscores a strong relationship, indicating that greater satisfaction with the university campus strongly relates to perceived availability and accessibility of campus spaces.

Overall, these findings emphasize the importance of an inclusive and accessible university environment in fostering affective commitment, social integration, well-being, and higher satisfaction with the campus. Investing in ILS will yield positive outcomes, potentially reducing intentions to quit studies and increasing recommendations (cf. Tinto, 1975). Positive relationships could enhance student inclusion and improve knowledge acquisition (cf. Berger & Milem, 1999). However, these results do not imply causation. It is possible that positive relationships drive increased use of spaces, affecting perceptions of availability and accessibility. Similarly, students with higher well-being might utilize university resources more, influencing their perceptions. Yet the quantitative results clearly show that SWFO have a decreased awareness of ILS' availability and accessibility on campuses.

In addition to the overarching sample, we looked at the confirmation of hypotheses across the different partner universities specifically. First, we investigated the significance of the relationship between availability and accessibility and desired outcomes in the different countries. We can summarize that overall the relationships are supported. AKD, HTW and MRU prove all relationships to be significant. At UWK availability and accessibility are not related to well-being. Also, for SAP availability and accessibility are not related to well-being and social integration In. Since the sample sizes are different, it is more reliable to look at the effect sizes. The effect sizes support the relationships between availability and accessibility and the desired outcomes for all countries with only marginal exceptions. To sum up, Hypotheses 1a to 1b is equally supported in all countries (for more information refer to Appendix 1.3.1). Hence, enhancing ILS significantly correlates with positive effects. Prioritizing the availability and accessibility of these spaces on campus is essential.

3.2.2. Hypothesis 2

Hypothesis 2: The availability, accessibility and satisfaction with **informal focused** learning spaces is higher than of **informal collaborative** learning spaces.

Table 12. Results of hypothesis 2

	Mean	SD	n	T-Test	Effect size Cohen´s d
Availability_FL	3.48	1.00	988	t (987) = 2.00, p = 0.046	0.06
Availability_CL	3.43	1.00	988		
Accessibility_FL	3.55	0.90	959	t (958) = 5.86, p < 0.001	0.19
Accessibility_CL	3.42	0.95	959		
Satisfaction_FL	3.34	0.99	944	t (943) = 0.60, p = 0.55	0.02
Satisfaction_CL	3.33	1.01	944		

Notes: 1 = totally disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = totally agree

As shown in Table 12, Hypothesis 2 is partly supported. Only Accessibility_FL is significantly higher than Accessibility_CL (t (958) = 5.86, p < 0.001). It examines potential differences in availability, accessibility, and satisfaction between informal learning spaces geared for focused individual learning and those designed for CL. Traditionally, universities have emphasized cognitive and functional competencies, favouring spaces tailored for individual activities such as reading and writing in libraries. Despite an increasing focus on social and personal competencies (Bohlinger, 2008) it can be anticipated that collaborative spaces will become more important for students, Consequently, the expectation was that spaces dedicated to focused individual learning would exhibit higher availability, accessibility, and satisfaction levels.

Results show that this is partly true. Based on the data, there's evidence suggesting slightly higher availability and significantly higher perceived accessibility in FL spaces compared to collaborative spaces. However, there is no notable difference in perceived satisfaction between the two types of spaces. One explanation could be that students perceive their home to be suitable to FL if there is no possibility at the university. But for CL many students cannot learn at home. Thus, the need for CL spaces is perceived to be higher than for FL activities. This result implies that universities should invest in informal CL spaces. Especially the accessibility (e.g. easy to reach, usable on short notice, no barriers) of informal CL spaces should be improved. Nevertheless, availability and accessibility of FL spaces should be held in a high standard as well.

Also concerning H2, we checked for significant results and effect sizes across the different partner universities. Results are mixed. There is small support that accessibility for FL is rated higher than accessibility of CL (AKD, HTW and SAP). At UWK results even show the opposite

direction: Availability and satisfaction for CL is rated slightly higher than availability and satis-faction of FL. In sum, these mixed results in the different countries indicate that there is no clear picture comparing availability, accessibility and satisfaction between FL and CL (for more information refer to Appendix 1.3.2).

3.2.3. Hypotheses 3a, 3b, 3c and 3d

Hypothesis 3a, 3b, 3c and 3d: Informal collaborative learning spaces are more relevant to enhance affective commitment, social integration, well-being and university campus satis-faction than informal focused learning spaces. In detail, the hypotheses imply that there is a slightly stronger relationship between informal CL spaces and affective commitment, social integration, well-being and university campus satisfaction than between informal FL spaces and affective commitment, social integration, well-being and university campus satisfaction.

Table 13. Results of hypotheses 3a, 3b, 3c and 3d

	Affective Commit-ment	Social Integration	Well-Being	University Cam-pus Satisfaction
Availability_FL	r = 0.25 p < 0.001	r = 0.21 p < 0.001	r = 0.21 p < 0,001	r = 0.49 p < 0.001
Availability_CL	r = 0.25 p < 0.001	r = 0.29 p < 0.001	r = 0.31 p < 0.001	r = 0.54 p < 0.001
Accessibility_FL	r = 0.27 p < 0.001	r = 0.25 p < 0.001	r = 0.23 p < 0.001	r = 0.53 p < 0.001
Accessibility_CL	r = 0.29 p < 0.001	r = 0.31 p < 0.001	r = 0.30 p < 0.001	r = 0.56 p < 0.001

Hypothesis 3 (see Table 13), suggesting that informal collaborative learning spaces have a slightly greater impact on desired outcomes compared to informal focused learning spaces (FL), is (probably) partly supported. Despite observed differences at a descriptive level, statis-tical significance was not established due to the high correlation between perceptions of FL and CL. Analyzing affective commitment, social integration, well-being, and university campus satisfaction in relation to both availability and accessibility within CL and FL spaces revealed weak to moderate positive associations for both types. Interestingly, informal CL spaces ex-hibited slightly stronger relationships to social integration and well-being compared to infor-mal FL spaces, suggesting that investing in informal CL spaces could improve social integration.

Yet, all in all, these associations were notably similar across both CL and FL spaces, indicating a comparable impact on affective commitment, social integration, well-being, and university campus satisfaction. Additionally, there seems to be less differentiation between the availa-bility and accessibility of these spaces by students, with most areas being used for various learning activities, except for specific spaces like the library, commonly utilized for FL. This uniformity in usage may be influenced by students' constrained awareness of ILS availability on campuses, prompting them to use what is readily available as a practical choice.

Furthermore, when comparing the five partner universities, only very small differences were observed on a descriptive level, which do not reveal a clear picture. Caution is advised in the interpretation of these findings, and further analyses are required to interpret the implications of the results.

3.2.4. Discussion hypotheses testing

In exploring the relationships between ILS and university-related factors, the hypotheses investigated revealed critical insights.

Hypotheses 1a, 1b, 1c, and 1d supported moderate relationships between the availability and accessibility of informal spaces and positive university experiences. These hypotheses found that higher availability and accessibility correlated significantly with a heightened affective commitment, better social integration, enhanced well-being, and greater campus satisfaction. Notably, campus satisfaction displayed a clear link with perceived availability and accessibility, emphasizing the importance of an inclusive university environment. Thus, availability and accessibility of ILS on campuses should be fostered.

Furthermore, Hypothesis 2 highlighted that while FL spaces exhibited slightly higher availability and significantly better accessibility compared to collaborative spaces, there was no significant difference in perceived satisfaction between these space types. This underscored the need to improve the accessibility of collaborative spaces (in terms of them being easy to reach, usable on short notice, being barrier free), calling for investments and enhancements in these areas.

Finally, the examination of students' perceptions of informal focused and CL spaces, as per Hypothesis 3, suggested that both space types appeared to have a positive impact on university-related factors, indicating a necessity for clear information provision to cater to students' versatile usage patterns. Particularly, social integration and well-being show stronger relationships to informal CL spaces than to informal FL spaces. To improve social integration, it is suggested to invest in informal CL spaces.

Overall, these findings emphasize the crucial role of accessible and inclusive informal learning spaces in fostering positive university experiences. They advocate for universities to invest in enhancing these spaces for a more supportive educational environment.

3.3.   Conclusion quantitative data analysis

The quantitative findings reveal that while there are significant disparities within the samples across the partner universities, nonetheless the hypotheses are confirmed across all partner universities and there are profound similarities concerning the selection and use of ILS, their availability and accessibility, as well as perceived obstacles of using ILS on campuses. Focused learning activities predominantly occur at home, collaborative learning happens in diverse settings, notably within seminar rooms and university canteens. Surprisingly, outdoor spaces maintain equal popularity across various climates. However, challenges like limited availability due to overcrowding or inconvenient opening hours can be a barrier to use ILS for FL and CL. The study's hypotheses reveal robust connections between ILS and positive university experiences. The accessibility and availability of these spaces significantly correlate with affective commitment, improved social integration, well-being, and campus satisfaction. Enhancing the availability and accessibility of ILS proves crucial in fostering a supportive university environment. Based on the data, there is evidence suggesting slightly higher availability and significantly higher perceived accessibility in FL spaces compared to collaborative spaces. Yet, satisfaction levels between these types show no significant difference, emphasizing the need to improve access to collaborative spaces for use and inclusivity. Students perceive both focused and collaborative spaces positively, with collaborative spaces exhibiting stronger associations with social integration and well-being. This highlights the necessity for clear communication to accommodate diverse usage patterns. Overall, these findings emphasize the pivotal role of accessible and inclusive ILS in shaping positive university experiences and advocate for investments and enhancements in these areas to enrich the educational environment and effectively support students throughout their academic journey. Additionally, the results underscore the relevance of ILS in increasing affective commitment, improving social integration, enhancing well-being, and boosting campus satisfaction. The strong connections between the availability and accessibility of these spaces, not only with related variables but also with overarching factors like social integration and well-being, are compelling. It can be assumed that enhancing campus quality will facilitate student integration and interactions, leading to greater satisfaction and well-being. It is suggested to research these relationships further in subsequent studies.

4. Focus group interviews: deductive themes

This chapter outlines how the research question is approached from a qualitative perspective, whereas the focus is on explorative research.

Table 11 displays the frame of the students' and lecturers' focus group interview guide, and simultaneously, the **four deductive themes** for both focus groups, which was the same for all partner universities:

Table 14. Deductive themes of the focus group interviews

1. Impact of the used informal or non-conventional learning spaces on students' / lecturers' knowledge acquisition and satisfaction with support and the learning environment.
2. Existing inequalities and barriers related to informal or non-conventional learning spaces, including access to tangible and intangible technical equipment (i.e., sockets, WIFI) as well as to physical-spatial environments conducive to learning and well-being.
3. Students' and lecturers' perception on awareness and enabling strategies to deal with existing inequalities and barriers.
4. Hybrid and virtual learning activities.

Thus, the themes capture the **selection and use**, their **availability** and **accessibility** of ILS on campuses, whereas **good practice examples** as well as **existing barriers** will be presented in the following. Additionally, **strategies** for action, **wishes**, **goals** and **ideas** of stakeholders to promote ILS on campus will be exemplified.

An English version of the interview guide for the students' and lecturers' focus group interviews (FGI) was developed by HTW Berlin as the lead partner of PR2. The interview guides were revised two times following the suggestions and comments of the project partners in a participatory process. Final guidelines, including interview questions and some instructions concerning the interview process, were translated into the respective languages (for more information refer to Appendix 2.1 and 2.2).

It was aimed to conduct at least one FGI with students (5-7 students, incl. three SWFO) and at least one FGI with lecturers (5-7 lecturers) from each university in each country. Data was transcribed, coded and analysed according to guidelines developed by HTW Berlin in cooperation with the partners. Please find the coding list in Appendix 2.3.

4.1. Sample

The FGI with students were conducted between May and June 2022 by all partner universities. Table 15 below outlines an overview of the sample data:

Table 15. Focus group participants – students

University	# Students	# SWFO	# Bachelor	# Master	Faculties
AKD	11	4	11	0	Sports Sciences; Education; Engineering; Health Services
HTW	5	3	3	2	Business School
MRU	5	3	5	0	Communication
SAP	6	3	5	1	Design, Multimedia and Visual Communication
UWK	7	5	0	7	Education; Arts; Architecture
Total	**34**	**18**	**24**	**10**	

In total 34 students were interviewed, thereof at least 18 SWFO. The students interviewed were with 71% predominantly pursuing a bachelor's degree while only 29% were master's degrees candidates and were part of a diverse range of faculties (see Table 13).

In addition, the FGI with lecturers were conducted between May and November 2022 on behalf of all partner universities. Table 166 below outlines an overview of the sample data:

Table 16. Focus group participants – lecturers

University	# Lecturers	Positions	Faculties
AKD	7	(Associate/Assistant) Professor	Medicine; Agriculture; Science; Letters; Administrative Sciences
HTW	4	(Associate) Professor, (Associate) Lecturer	Culture and Design; Engineering – Technology and Life; Business School
MRU	5	(Associate) Professor; Head of the Institute of Communication	Communication
SAP	8	(Associate) Professor, (Associate) Lecturer, Researcher, Post-Doc, Faculty Member	Architecture
UWK	8	Lectures; Staff member of the "Office for Equality, Gender and Diversity"	Education, Arts and Architecture; Business and Globalisation
Total	**32**		

In total 32 lecturers were interviewed, thereof predominantly (associate or assistant) professors, lecturers, researcher, as well as a head of faculties and university staff, whereas the interviewees were belonging to diverse faculties. Accordingly, the data analysis conducted is a meta-analysis based on all NIILS partner country reports.

4.2. Results

The subsequent section presents results and key insights derived from the students and lecturer FGIs conducted in all participating partner universities, organized according to the sequence of the four deductive interview themes (see Table 14 and the detailed coding list in Appendix 2.3). Emphasis is placed on scrutinizing overlaps and saliences from a partner overarching perspective.

4.2.1. Knowledge, use and satisfaction with ILS

Impact of the used informal or non-conventional learning spaces on students' / lecturers' knowledge acquisition and satisfaction with support and the learning environment

Students and lecturers were asked about their knowledge and (students') frequent use of ILS on their campuses, supported by campus maps from the NIILS partner universities. The maps, highlight in different colours spaces for various learning activities (**focused, collaborative, unspecific**). The campus maps and a detailed photo documentations of specific ILS per partner university can be found in the respective individual reports of each country (cf. AKD-; HTW-; MRU-; SAP-; UWK PR2 Report, 2023).

Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! **Ungültiger Eigenverweis auf Textmarke.**7 summarizes the data gathered from the students' FGI. It indicates that **more indoor** (n = 10) **than outdoor** (n = 4) **space types** were identified in the students' FGI:

Table 174 (students' FGI) and Table 15 (lecturers' FGI) provide a comprehensive overview of identified space types for on-campus ILS, both indoors and outdoors, across all NIILS partner universities (AKD, HTW, MRU, SAP, UWK). It outlines the occurrences and use of ILS space types within the universities, while demonstrating space preferences for FL and CL. Similar spaces identified across different universities have been grouped into overarching space types for clarity. Thus, the table categorizes various indoor and outdoor spaces, illustrating how each university allocates these spaces between FL and CL activities. Each row in the tables corresponds to a specific **space type**, totalling **10 indoor spaces** and **4 outdoor spaces**, showcasing the usage rates for FL and CL horizontally, with a maximum achievable percentage of 100% per row. Due to differences in interviewing off-campus spaces among partner universities and a consequent lack of comparability, the analysis is limited to on-campus spaces. Additionally, while this offers a detailed perspective on how students across partner universities currently use diverse ILS for either FL or CL on campuses, it can help identifying potential gaps and/or areas where specific space types might be underrepresented across partner universities.

➢ *ILS space types identified in the students' FGI*

Fehler! Ungültiger Eigenverweis auf Textmarke.7 summarizes the data gathered from the students' FGI. It indicates that **more indoor** (n = 10) **than outdoor** (n = 4) **space types** were identified in the students' FGI:

Table 17. ILS space types identified in the students' FGI

On-campus spaces	Learning activities FL = focused learning, CL = collaborative learning	Universities										Usage rate of space types at all universities		
		AKD		HTW		MRU		SAP		UWK				
		FL	CL	FL	CL	FL	CL	FL	CL	FL	CL	FL & CL	FL	CL
Indoor	1 Seminar room	x	x	x	x		x	x	x	x	x	90%	80%	100%
	2 Library/library foyer/reading room	x	x	x		x	x			x	x	70%	80%	60%
	3 Hallway-seating/corridor space/seating				x	x	x	x	x	x	x	70%	60%	80%
	4 Canteen/café		x		x		x			x	x	50%	20%	80%
	5 (Computer) laboratory	x		x	x	x						40%	60%	20%
	6 Faculty entrance/foyer/main	x					x	x	x			40%	40%	40%
	7 (Halls/study room) at dormitory				x	x	x					30%	20%	40%
	8 Creative Space			x	x							20%	20%	20%
	9 Working area/working lounge	x								x		20%	40%	0%
	10 Meeting room				x							10%	20%	0%
Usage rate of space types indoor per university		50%	50%	40%	50%	40%	60%	30%	30%	50%	40%	40%	40%	40%
Usage rate of space types CL&FL indoor per university		50%		45%		50%		30%		45%				
Outdoor	1 Park/green areas/field/bench	x	x	x	x	x	x		x	x	x	90%	80%	100%
	2 Outdoor-canteen/café		x	x	x					x	x	50%	40%	60%
	3 Outdoor/inside-yard			x	x	x					x	40%	20%	60%
	4 Beach			x	x							20%	20%	20%
Usage rate of space types outdoor per university		25%	50%	100%	100%	25%	50%	0%	25%	50%	75%	45%	30%	60%
Usage rate of space types CL&FL outdoor per university		38%		100%		38%		13%		63%				

➢ *Indoor ILS - students' perspective*

Concerning indoor ILS, students across all partner universities, **predominantly use seminar rooms** (90%), followed by **libraries** (70%, incl. silent reading rooms and noisier library foyers) as well as **hallway-seating areas and corridor spaces** (70%) for focused as well as collaborative

learning activities. ILS that mediocrely occurred as indoor spaces on-campus for both study types were canteens and cafés (50%), (computer) laboratories (40%), as well as foyers and main entrance halls (40%). Different space types seem to fit better to certain learning activities. For instance, **seminar rooms** serve as **multipurpose spaces** accommodating both FL and CL activities. Conversely, **canteens and cafés** are inclined more towards **CL activities**, while **libraries** are predominantly used for **FL activities** by students.

Furthermore, the table suggests that each partner university has room for enhancing their identified indoor ILS, and with that, potentially increasing their use among students. This is evident as the highest usage rate for any space type across all universities stands at a maximum of 60% (i.e. CL at MRU), while other universities exhibit lower usage rates for identified space types, all falling below the 60% mark for indoor spaces on campuses.

➢ *Outdoor ILS - students' perspective*

Regarding outdoor ILS, among partner universities, open spaces like **parks, green areas, fields, and benches** have the **highest usage rate** (100%). Outdoor canteens, cafés and inside yards seem to have moderate use (60%) across partner universities. **Parks, green areas, outdoor canteens/cafés** and the **beach** are seemingly **used for both FL and CL activities**, whereas only **yards** seem to be used slightly **more for FL.**

Similarly, there is room for improvement across partner universities in optimizing the identified outdoor ILS, potentially boosting their use among students. The highest usage rate across universities for outdoor space types reach 100% at HTW, while other universities register lower usage rates ranging from 0% to 75% for outdoor spaces on campuses.

➢ *ILS space types identified in the lecturers' FGI*

In addition, Table 188 summarizes the data gathered from the **lecturers' FGI.** It indicates that **more indoor** (n = 10) **than outdoor** (n = 4) **space types** were identified in the lecturers' FGI. Like in the students' FGI, the lecturers seemed to have similar knowledge of ILS that students use on campuses. Hence, the same table structure could be retained:

Table 18. ILS space types identified in the lecturers' FGI

On-campus spaces		Learning activities FL = focused learning, CL = collaborative learning	Universities										Usage rate of space types at all universities		
			AKD		HTW		MRU		SAP		UWK				
			FL	CL	FL	CL	FL	CL	FL	CL	FL	CL	FL & CL	FL	CL
Indoor	1	Seminar room	x	x	x	x	x	x	x	x			80%	80%	80%
	2	Library/library foyer/reading room	x		x	x	x	x	x		x	x	80%	100%	60%
	3	Hallway-seating/corridor space/ seating island/booth/standing desks/staircase			x	x	x	x	x	x		x	70%	60%	80%
	4	Canteen/café	x	x	x	x		x				x	60%	40%	80%
	5	(Computer) laboratory		x			x	x					30%	20%	40%
	6	Faculty entrance/foyer/main hall			x	x		x	x	x			60%	40%	80%
	7	(Halls/study room) at dormitory	x				x						20%	40%	0%
	8	Creative space				x							10%	0%	20%
	9	Working area/lounge/center		x							x	x	30%	20%	40%
	10	Meeting rooms/conference halls/offices	x	x									20%	20%	0%
Usage rate of space types indoor per university			50%	50%	40%	50%	40%	60%	30%	30%	50%	40%	45%	40%	50%
Usage rate of space types CL&FL indoor per university			50%		45%		50%		30%		45%				
Outdoor	1	Park/green areas/field/bench	x	x	x	x	x	x			x	x	80%	80%	80%
	2	Outdoor-canteen/café	x	x	x								30%	40%	20%
	3	Outdoor foyers/inside-yard			x	x	x	x	x			x	70%	60%	80%
	4	Beach/pool			x	x						x	30%	20%	40%
Usage rate of space types outdoor per university			50%	75%	100%	75%	50%	50%	25%	0%	25%	75%	50%	50%	60%
Usage rate of space types CL&FL outdoor per university			63%		88%		50%		13%		50%				

➢ *Indoor ILS - lecturers' perspective*

Regarding indoor ILS, across partner universities, lecturers across the partner universities also view **seminar rooms as a predominant informal space** used by students for learning activities, with a usage rate of 80% for **both FL and CL activities**. However, in the same way lecturers believed **libraries, including silent reading rooms and busier library foyers**, to be a **popular space** (80%), while it is assumed to be **mainly used for FL** (100%) instead of CL (60%). In turn, **interim spaces** such as hallway-seating areas, corridor spaces, staircases, entrance halls and foyers as well as canteens and cafés where ILS students were spotted to conduct particularly **often CL activities** (80%).

Moreover, also this table suggests that each partner university has room for enhancing their identified indoor ILS, and with that, potentially increasing their use among students from the

perspective of lecturers. The highest usage rate for any indoor space type across all universities stands at a maximum of 60% (i.e. CL spaces at MRU), while other universities exhibit lower usage rates for identified space types, all falling below the 60% mark for indoor spaces on campuses.

> ➢ *Outdoor ILS – lecturers' perspective*

Much like in the student FGs, lecturers view open spaces like **parks, green areas, fields, and benches** as most frequently used (80%), followed by **outdoor foyers and yards for both learning activities** concerning outdoor ILS.

Similarly, there is room for improvement across partner universities in optimizing the identified outdoor ILS, potentially increasing their use among students. The highest usage rate across universities for outdoor space types reach 88% at HTW, while lecturers at other universities register lower usage rates ranging from 13% to 63% for outdoor spaces on campuses.

In summary, there are **no considerable differences in students' knowledge of ILS or in lecturers' awareness of students using ILS across different countries and universities.** Both students and lecturers show familiarity with various indoor and outdoor ILS across partner universities' campuses.

Interestingly, irrespective of countries and their respective weather conditions (as detailed in the NIILS Comparative Report, 2023), there is a greater knowledge of indoor ILS compared to outdoor ILS in all countries. This raises questions about potential weaknesses or barriers related to suitable outdoor facilities, such as the lack of weather protection (i.e., shade, roofing) or technological infrastructure.

In addition to investigating students' awareness of ILS on campuses, it is equally crucial to assess their perceptions of the quality of these spaces. Notable points across partner universities can be summarized as follows:

MRU students express high satisfaction with on-campus ILS (cf. MRU, PR2 Report, 2023), while students at SAP face challenges in identifying a diverse range of ILS (cf. SAP, PR2 Report, 2023). The feedback gathered from FGI with lecturers indicates that SAP and MRU lecturers are generally satisfied with the availability of ILS on campuses. However, SAP lecturers believe that students prefer using off-campus spaces for self-organized learning activities, including their place of residence, friends' houses, and virtual collaboration platforms (cf. SAP, PR2 Report, 2023), a perspective not mentioned in the interviews with students. Lack of available spaces for informal interactions between students and lecturers at HWTW is acknowledged, leading lecturers to overcome this barrier by organizing informal meetings in virtual spaces (cf. HTW, PR2 Report, 2023). Students at AKD and UWK express a preference for open spaces when engaging in CL activities (cf. AKD-; UWK, PR2 Report, 2023), while HTW students are less expressive about their satisfaction or preferences for favorite and frequently used ILS. However, FGI with HTW students extensively address existing barriers and weaknesses concerning the

availability and accessibility of identified ILS on the campuses (cf. HTW, PR2 Report, 2023). Similarly, both strengths and weaknesses of available ILS, such as the lack of creative and collaborative indoor spaces and inadequate outdoor spaces for FL, are highlighted in the interviews with lecturers at most partner universities (cf. AKD-; HTW-; MRU-; and UWK PR2 Report, 2023).

4.2.2. Existing inequalities and barriers related to ILS

Existing inequalities and barriers related to informal or non-conventional learning spaces, including access to technical equipment, internet and physical-spatial environments conducive to learning and well-being

> ➢ *Availability of ILS and barriers*

Table 199 and 20 show that students and lecturers interviewed across the NIILS partner universities not only identified existing ILS for focused and collaborative learning activities but also highlighted present barriers present in those.

Specifically, **students** at MRU and AKD reported an array of ILS on their respective campuses (cf. MRU-; AKD, PR2 Report, 2023). Moreover, students at HTW did not see the availability as critically but rather expressed concerns regarding the suitability of available ILS for FL and CL activities (cf. HTW, PR2 Report, 2023). At SAP, students noted variations in the availability of ILS across faculties and campuses (cf. SAP, PR2 Report, 2023), while those at UWK expressed a scarcity of ILS suitable for collaborative and focused learning activities on their campus (cf. UWK, PR2 Report, 2023).

Likewise, **lecturers** observed that there are many existing spaces on campuses that could be potentially used for learning purposes, yet they seem to be **underutilized** by students since they **mainly need improvement** and seem to be **designed unsuitably for learning activities as of now** (cf. AKD-; HTWB-; MRU-; SAP-; UWK PR2 Report, 2023). According to lecturers' observation, this often leads to students settle in unoccupied seminar rooms, often unsuitably designed for frontal teaching, or to students seeking spaces off-campuses (cf. SAP, PR2 Report, 2023). Overall, most NIILS partner university students and lecturers stressed that the **key concern about ILS availability is not mainly a lack in quantity but rather a deficiency in quality due to existing barriers** (cf. AKD-; HTW-; MRU-; SAP-; UWK, PR2 Report, 2023).

According to the interviewed students and lecturers, the **quality of available ILS** at the partner universities' campuses can be restrained by the identified **barriers** summarized in 19 and 20. The tables portray the quality barriers of available ILS identified in the FGI across the NIILS partner universities. The tables show which availability barriers were identified in which partner university, whereas in total the maximum occurrence of each availability barrier is max. = 5 (representing occurrences in all five partner universities). In total, **12 types of availability barriers were identified in the students' and lecturers' FGI**, which only slightly differ in their content. These barriers arose partially deductively from pre-defined categories and partially inductively through the analysis of the discussions.

The FGI with students indicate that students across all NIILS partner universities view a constrained technological infrastructure in existing ILS as a main barrier as shown in Table 17 ($\sum$ = 5, cf. AKD-; HTW-; MRU-; SAP-; UWK PR2 Report, 2023). Furthermore, in some focus groups, specific examples, such as the shortage of power plugs ($\sum$ = 4, cf. AKD-; HTW-; MRU-; SAP PR2 Report, 2023), challenges with campus Wi-Fi connectivity ($\sum$ = 3, cf. AKD-; SAP-; UWK PR2 Report, 2023), and deficiencies in provided technical equipment on-site ($\sum$ = 2, cf. AKD-; MRU PR2 Report, 2023), were identified as barriers affecting the quality of available ILS on campuses.

Moreover, students across nearly all partner universities recognized non-weatherproof ILS as a significant barrier affecting existing outdoor spaces ($\sum$ = 4, cf. AKD-; HTW-; MRU-; UWK PR2 Report, 2023).

Students of three out of five partner universities viewed a lack of soundproofing and thus high noise-levels ($\sum$ = 3, cf. AKD-; HTW-; UWK PR2 Report, 2023), inadequate temperature in ILS, that are either too hot in summer or too cold in winter ($\sum$ = 3, cf. AKD-; MRU-; SAP PR2 Report, 2023), as well as lack of privacy ($\sum$ = 3, cf. AKD-; HTW-; UWK, PR2 Report, 2023), as barriers that seemingly reduce students' well-being in existing ILS.

Besides, students of two universities mentioned uncomfortable ergonomics (such as small tables, chairs without backrests, etc.) as well as insufficient number of tables and chairs and small sizes of ILS as barriers (cf. AKD-; UWK PR2 Report, 2023). Additionally, inconvenient smell in ILS (i.e., in the canteen; cf. AKD, PR2 Report, 2023) as well as lacking gastronomic offers nearby (cf. HTW PR2 Report, 2023) were mentioned to be barriers lowering the quality of available ILS.

Table 19. Quality barriers of available ILS identified in the students' FGI

Availability barriers			Universities					Totals
			AKD	HTW	MRU	SAP	UWK	Max. 5
1	Limited technological infrastructure		x	x	x	x	x	5
2		Lack power plugs	x	x	x	x		4
3		Weak/slow Wi-fi connection/complex access to Wi-fi	x			x	x	3
4		Lack of offered technical equipment on-site (i.e. computers)	x		x			2
5	Outdoor spaces are not weatherproof (missing roofing for shadow or rain)		x	x	x		x	4
6	Lack of soundproofing (high noise level)		x	x			x	3
7	Inadequate temperature (too hot in summer, too cold in winter)		x		x	x		3
8	Lack of privacy/subjective security		x	x			x	3
9	Uncomfortable ergonomics (tables too small, no backrest, etc.)		x				x	2
10	Small size of spaces/insufficient number of tables and chairs		x				x	2
11	Lack of hygiene/cleanliness/inconvenient smell		x					1
12	Lack of gastronomic offers nearby			x				1
	Totals		11	6	5	4	7	33

The FGI with lecturers indicate that lecturers across all NIILS partner universities observed very similar barriers in existing ILS on campuses like their students, as shown in Table 20.

Technological barriers seem to be perceived more strongly by students than by lecturers (∑ = 3, cf. AKD-; HTW-; SAP PR2 Report, 2023), whereas many other barriers, such as nonweatherproof outdoor spaces, lack of soundproofing, uncomfortable ergonomics, small spaces and inadequate resources are equally strong perceived by students and lecturers (cf. AKD-; HTW-; MRU-; SAP-; UWK PR2 Report, 2023).

Inadequate temperatures, lack of privacy, lack of hygiene and inconvenient smell were barriers that were perceived by students but not by lecturers. In turn, lack of gastronomic offers nearby is more strongly perceived by lecturers than by students, whereas lecturers additionally believed that unsuitable lightning and ventilation as well as a lack of creative, collaborative and meeting spaces are additional barriers that affect the availability of ILS on campuses (cf. AKD-; HTW-; MRU-; SAP-; UWK PR2 Report, 2023).

Table 20. Quality barriers of available ILS identified in the lecturers' FGI

Availability barriers		Universities					Totals
		AKD	HTW	MRU	SAP	UWK	Max. 5
1	Limited technological infrastructure	x	x		x		3
2	Lack power plugs	x			x		2
3	Weak/slow Wi-fi connection/complex access to Wi-fi	x	x		x		3
5	Outdoor spaces are not weatherproof (missing roofing for shadow or rain)	x		x	x	x	4
6	Lack of soundproofing (high noise level)		x	x			2
8	Unsuitable lightning/ventilation		x	x			2
9	Uncomfortable ergonomics (tables too small, outdated, not suitable, etc.)	x	x		x		3
10	Small size of spaces/insufficient number of tables and chairs/inadequate resources	x			x	x	3
11	Lack of creative/collaborative/meeting spaces	x		x	x	x	4
12	Lack of gastronomic offers nearby			x	x	x	3
	Totals	7	5	5	8	4	28

Overall, according to students and lecturers at all partner universities, the barriers affecting the quality of available ILS on campuses primarily relate to structural and technical limitations within existing spaces.

➢ *Accessibility of ILS and barriers*

Next to the availability of ILS on campuses of the NIILS partner universities, the **accessibility** to those has been investigated in the students' and lecturers' FGI. Tables 21 and 22 portray the accessibility barriers of ILS identified in the FGI across the NIILS partner universities. Accordingly, in total the maximum occurrence of each accessibility barrier is max. = 5 (representing occurrences in all five partner universities). **In total 7 types of accessibility barriers were identified** in each FGI.

According to the **students' FGI** the primary barriers hindering access to ILS across all NIILS partner universities are restricted access and/or locked spaces, with a specific emphasis on libraries, seminar rooms, and computer rooms, as shown in Table 21Table 21 (∑ = 5, cf. AKD-; HTW-; MRU-; SAP-; UWK PR2 Report, 2023). Further, students from all partner universities, except MRU, highlighted a lack of transparency and insufficient information regarding the process of unlocking spaces using student IDs, changes in schedules and room-occupations, and opening hours in these spaces (∑ = 4, cf. AKD-; HTW-; SAP-; UWK PR2 Report, 2023). There appears to be a general deficiency in providing a comprehensive overview of potential ILS on campuses. This lack is evident in the absence of ILS maps, informative signs, and user-friendly room-booking systems, which are not made available to students by the universities (∑ = 4, cf.

AKD-; HTW-; SAP-; UWK PR2 Report, 2023). Moreover, students noted limited accessibility to available ILS due to frequent occupancy, overcrowding, or high levels of busyness ($\sum$ = 4, cf. AKD-; HTW-; SAP-; UWK PR2 Report, 2023). In addition, restrictive regulations governing food consumption or noise levels were identified as barriers in all universities except SAP ($\sum$ = 4, cf. AKD-; HTW-; MRU-; UWK PR2 Report, 2023). Barriers due to opening hours in general or physical access were less mentioned by students (cf. AKD-; HTW-; UWK PR2 Report, 2023).

Table 21. Accessibility barriers of ILS identified in the students' FGI

Accessibility barriers		Universities					Totals
		AKD	HTW	MRU	SAP	UWK	Max. 5
1	Locked spaces/controlled access (i.e., library, seminar- and computer rooms)	x	x	x	x	x	5
2	Lack of information/transparency and knowledge (i.e., ability to unlock spaces with student ID; updates and changes of schedules and opening hours)	x	x		x	x	4
3	Poor overview of spaces (i.e., absence of ILS maps, informative signs, and room booking system)	x	x		x	x	4
4	Restrictive rules of use (i.e., concerning consumption of food; permitted noise-level; bring along belongings)	x	x	x		x	4
5	Occupation of spaces/overcrowded/too busy	x	x		x	x	4
6	Restricted opening hours	x	x			x	3
7	Physical barriers	x					1
	Totals	7	6	2	4	6	25

The FGI with lecturers indicate that lecturers across all NIILS partner universities observed the same types of barriers concerning the accessibility of existing ILS on campuses like their students. However, from a partner overarching perspective, lecturers seem to generally assign a much lesser occurrence to those barriers and seem to perceive them less problematic compared to their students (see Table 22). For instance, HTW, MRU and SAP lecturers admit that opening hours are restricted but do not view this as a barrier to students, as they can use those places during the opening hours (cf. HTW-; MRU-; SAP PR2 Report, 2023). This might indicate that the question whether or not something can be viewed as an accessibility barrier is perceived different by the users (students) vs. the observers (lecturers).

Similar to the students' FGI, lecturers seem to observe accessibility barriers more as administrative and organisational barriers as compared to physical barriers (cf. AKD-; HTW-; MRU-; SAP-; UWK PR2 Report, 2023).

Compared to the students' FGI, lecturers seemed to be informed about the formal regulations for students concerning accessing certain ILS to a lesser extent, which highlights their positions rather as observers instead of users of ILS on campuses.

Table 22. Accessibility barriers of ILS identified in the lecturers' FGI

Accessibility barriers		Universities					Totals
		AKD	HTW	MRU	SAP	UWK	Max. 5
1	Locked spaces/controlled access (i.e., library, seminar- and computer rooms)	x	x	x			3
2	Lack of information/transparency and knowledge (i.e., ability to unlock spaces with student ID; updates and changes of schedules and opening hours)				x		1
3	Poor overview of spaces (i.e., absence of ILS maps, in-formative signs, and room booking system)				x	x	2
4	Restrictive rules of use (i.e., concerning consumption of food; permitted noise-level; bring along belongings)				x		1
5	Occupation of spaces/overcrowded/too busy	x	x				2
6	Restricted opening hours	x			x		2
7	Physical barriers					x	1
	Totals	3	2	1	4	2	**12**

Concerning Tables 19-22 it is noteworthy to say that the total count of barrier occurrences per partner university might not accurately reflect the quality and/or accessibility of each university's ILS since this count could partly be influenced by how precisely questions concerning barriers have been asked within the semi-structured interview guide and/or could be due to the specific perspectives of participants surveyed in the FGI.

➤ *SWFO's barriers of use for ILS*

As ILS should be aiming for technological advancement and inclusivity, in the FGI with students SWFO were asked about perceived barriers in their use of ILS, as shown in Table 23. Hence, the table portrays the barriers of SWFO interviewed in the students' FGI across the NIILS partner universities as well as their implied impact on the use of ILS on campuses. Accordingly, in total the maximum occurrence of each accessibility barrier is max. = 5 (representing occurrences in all five partner universities). **In total 6 types of barriers of SWFO were identified.** In addition, in the lecturer FGI lecturers have been asked about their observation of SWFO and their use of ILS.

Financial constraints emerged as a primary barrier, which is the largest group of SWFO also shown in the results of the quantitative survey results as discussed before. According to the FGI, this barrier is about **necessitating balancing work and study**, consequently reducing time to focus on studies and restricting flexibility to stay on campus besides mandatory lectures (∑ = 5, cf. AKD-; HTW-; MRU-; SAP-; UWK PR2 Report, 2023). Although some students, particularly those at HTW, do not perceive working alongside studies as a barrier, it seems to impact their use of ILS, as students mentioned having less time to spend on campus due to work, affecting their use of these spaces (cf. HTW PR2 Report, 2023). This has been observed by HTW and SAP lecturers as well (cf. HTW-; SAP PR2 Report, 2023).

Further, particularly Erasmus+ and/or other international students face **language barriers** as a barrier to use ILS on campuses, due to lacking communication, in terms of missing instructions, guidelines and/or resources concerning accessing and using ILS on campuses ($\sum = 4$, cf. AKD-; MRU-; SAP-; UWK PR2 Report, 2023).

SWFO from HTW and SAP highlighted **geographical barriers** and the **distance** of the university campus as obstacles to flexibly using ILS due to long commuting times, which was also observed and mentioned in the lecturers FGI (cf. HTW-; SAP PR2 Report, 2023). Here, SAP lecturers mentioned the importance of providing hybrid and/or virtual learning alternatives to students, which can be relieving particularly for SWFO (SAP PR2 Report, 2023).

Only SWFO of AKD reported **physical barriers** such as limited visibility or mobility, which were cited as hindrances to accessing on-campus ILS. These barriers stemmed from inadequate disability-friendly support, including insufficient signage and accessible pathways to these areas (such as restricted visibility/mobility). In addition, lecturers of AKD mentioned that particularly older faculty buildings and dormitories lack in disability-friendliness (cf. AKD PR2 Report, 2023). In addition, UWK SWFO reported to deal with **family related barriers** (i.e. childcare) and **learning disabilities** (cf. UWK PR2 Report, 2023).

Table 23. Barriers of SWFO to use ILS identified in the students' FGI

SWFO Barriers		Impact on ILS according to SWFO	Universities					Totals
			AKD	HTW	MRU	SAP	UWK	Max. 5
1	**Financial barriers/need to work next to studying**	Lesser time to focus on studies, little flexibility to visit the campus	x	x	x	x	x	**5**
2	**Language barriers**	Communication challenges (instructions, guidelines, or resources)	x		x	x	x	**4**
3	**Geographical barriers/distance to university**	Absence and/or little flexibility to visit the campus, long commuting times		x		x		**2**
4	**Physical barriers (i.e., restricted visibility, mobility, etc.)**	Difficulties to access campus spaces (lack of disability-friendly support, signs/paths)	x					**1**
5	**Family related barriers (i.e. childcare, care giving needs)**	Absence and/or little flexibility to visit the campus					x	**1**
6	**Learning disabilities (i.e., dyslexia, dyscalculia, or ADHD)**	(no explanation cited in the FGI)					x	**1**
	Totals		**3**	**2**	**2**	**3**	**4**	**14**

Overall, it seems that students with and without fewer opportunities seem to face **more or-ganisational than infrastructural barriers** concerning the availability and accessibility of ILS on campuses across all partner universities. Limited diversity and restricted accessibility of existing ILS on campus might decrease students' learning opportunities. Students encounter infrastructure-related availability issues as well as organizational accessibility barriers, whereas organizational barriers notably hinder students' use of ILS on campuses more than infrastructure-related barriers do.

<h3 style="color:#4a90b8">4.2.3.   Awareness and enabling strategies to deal with barriers of ILS</h3>

Students' and lecturers' perception on awareness and enabling strategies to deal with existing inequalities and barriers

- *Students' and lecturers' awareness and strategies to reduce barriers*

The partner universities' **students and lecturers** share commonalities in their perceptions re-garding lecturers and/or university administrations' awareness and strategies aimed at reduc-ing barriers to promote ILS, as for example:

1. **Awareness without effective action:**
- Both students and lecturers share the perception that lecturers and/or university admin-istration are aware of existing issues, but there is a noticeable absence of proactive measures to address these barriers at AKD, HTW, and SAP (cf. AKD-; HTW-; SAP PR2 Re-port, 2023).
- While there have been some improvements, concerns persist that the university manage-ment, particularly at HTW and AKD, is allocating insufficient resources to promote ILS on campus (cf. AKD-; HTW PR2 Report, 2023).
- Lecturers at AKD specifically attribute the gap between awareness and action to budget constraints, bureaucratic hurdles, and organizational obstacles (cf. AKD PR2 Report, 2023).
- Conversely, at MRU, students and lecturers express a contrasting viewpoint and do not believe that there are profound existing barriers as well as that the university management is actively addressing any issues (cf. MRU PR2 Report, 2023).

2. **Awareness gap and communication issues:**
- At UWK, students and lecturers are not fully aware of the strategies put forward by lectur-ers or the university administration, which shows a gap in understanding between prob-lems and solutions to improve ILS (see UWK PR2 Report, 2023).- MRU and AKD students perceive a gap between recognising barriers and taking action to report them, resulting in a lack of engagement between students, lecturers and university administration (see AKD; MRU PR2 Report, 2023).- As a result, communication challenges persist at MRU and AKD, affecting the resolution of barriers and creating a gap in the awareness of lecturers and university management, as certain issues may not be re-ported by students (see AKD; MRU PR2 Report, 2023).

3. **Awareness of promoting hybrid and digital spaces:**

- Both students and lecturers at SAP and MRU recognize the awareness concerning expanding hybrid and digital spaces to accommodate students' needs (cf. MRU-; SAP PR2 Report, 2023).

In summary, there is a prevailing perception across partner universities that while lecturers and university administration seem to be aware of barriers of ILS on campuses, the implementation of proactive measures to address barriers seems limited or absent in most universities. This is compounded by a notable discrepancy between students' awareness of barriers and them reporting actions, indicating communication challenges. While each university faces individual challenges, a common theme emerges: the need for improved communication and proactive measures to address identified barriers. Bridging the gap between students' awareness and the implementation of solutions by lecturers and university administrations appear crucial. **Establishing effective channels for reporting issues and ensuring proactive action to resolve them can significantly enhance promoting ILS on campuses**.

➢ *Students' and lecturers' ideas and potential plans to break these barriers*
Students and lecturers at UWK, SAP, and MRU did not provide concrete solutions to overcome barriers (cf. UWK-; SAP-; MRU PR2 Report, 2023). SAP students identified structural issues and an absence of on-campus ILS, seemingly prompting them to take a passive position explore alternatives off-campus instead (cf. SAP PR2 Report, 2023). Conversely, MRU students and lecturers found barriers too minimal to initiate plans of actions (cf. MRU PR2 Report, 2023). However, the remaining two universities shared diverse plans to address these barriers:

- In the **students' FGI**, HTW **students** suggested multiple solutions, including a **user-friendly room booking system**, **improved ILS access via student ID cards, acoustically as well as visually shielded spaces**, and diverse **creative spaces** on campus. These proposals aimed to increase the appeal of ILS (cf. HTW PR2 Report, 2023).
- AKD **students** presented a range of solutions: **regular meetings with the dean's office**, **time limits/reservations for study spaces**, **centralized study buildings for collaboration**, **enhancements of outdoor spaces**, **proactively addressing SWFO's needs**, **improving campus accessibility**, and **creating web platforms for ILS information** (cf. AKD PR2 Report, 2023).

While HTW **students** proposed innovative solutions to enhance ILS attractiveness and use, AKD **students** displayed a multifaceted approach, encompassing various improvements from communication to technological tools to overcome and address barriers that hinder promoting ILS on campuses.

- Concerning the **lecturers' FGI**, lecturers at HTW and AKD stress the **importance of heightened commitment and active participation among all stakeholders** (lecturers, students, university management) in discussions and design processes to form a strong sense of community to promote ILS (cf. AKD-; HTW PR2 Report, 2023).

- HTW lecturers advocate for **a holistic approach to campus improvement**. To overcome budget constraints and resistance, they propose implementing **pilot projects** to assess user acceptance and raise awareness for ILS promotion. Additionally, the lecturers call for **centralizing ILS** and **creating creative spaces** to foster a vibrant sense of community through initiatives such as excursions and off-campus facilities (cf. HTW PR2 Report, 2023).

- AKD lecturers contribute vital perspectives to **improve campus functionality**. They high-light the **importance of effective communication** among faculty, administration, and students to heighten awareness of existing barriers. Additionally, they advocate for empha-sizing the **efficient use of existing buildings**, including the establishment of **faculty-specific libraries** and **enhancements to outdoor areas**. AKD lecturers encourage the adoption of **architectural expertise, eco-friendly and ergonomic design** principles, promoting sustain-ability (cf. AKD PR2 Report, 2023).

Thus, HTW and AKD lecturers stress the crucial role of increased stakeholder commitment and participation for promoting ILS and emphasize effective communication, architectural consid-erations, sustainable design to enhance campus vibrancy (cf. AKD-; HTW PR2 Report, 2023).

4.2.4. Hybrid and virtual learning activities

In addressing hybrid and virtual learning activities, students as well as lecturers across the partner universities shared notable similarities as well differences in perspectives during the FGI.

Students across all partner universities expressed challenges in accessing comprehensive in-formation about ILS on campus. This lack of information led students to rely on informal chan-nels like word-of-mouth or insider knowledge, prompting a collective wish for improved **guid-ance tools** such as **digital maps** and **real-time updates** for these spaces. Additionally, there was a common emphasis on enhancing physical learning environments by **improving commu-nication and accessibility**, for instance by **proposing the integration of digital tools or apps** to facilitate easy access to these spaces (cf. AKD-; HWTB-; MRU-; SAP-; UWK PR2 Report, 2023). Further, students across universities use various online platforms for synchronous and asynchronous hybrid collaborative learning. These tools (incl. Zoom, Teams, Google Drive, and WhatsApp) help overcome time and location constraints, enabling collaborative efforts de-spite of geographical distribution. The virtual space proved beneficial in mitigating barriers, offering personalized learning experiences and easier access CL activities, especially for work-ing students (cf. AKD-; HWTB-; MRU-; SAP-; UWK PR2 Report, 2023).

Lecturers across the partner universities recognize the challenges as well as advantages of hybrid and virtual learning activities expressed by students. Although lecturers encourage in-person attendance on campus, it seems inevitable that often virtual participation is preferred by students, which emphasizes the need to focus on adapting to these shifts pedagogically in the long-term. Although lecturers have reservations about the practicality of virtual learning

spaces, they have taken proactive measures by implementing a variety of tools to assist students in collaborative hybrid group work. Accordingly, virtual spaces can be viewed not as substitutes but as extensions of the physical environment (cf. AKD-; HWTB-; MRU-; SAP-; UWK PR2 Report, 2023).

In addition to that, differences regarding emphasises on the specific needs and preferences among the **students** of the partner universities were collected:

- AKD students and lecturers both recognize benefits of hybrid and virtual learning platforms and potentials to enhance physical interactions, lecturers believe it can also constrain physical interaction in specific fields (i.e. counselling and psychology). Further, students emphasized the necessity for an application offering real-time location updates for ILS and facilitated group work platforms for disabled students, with this highlighting user specific challenges and needs (cf. AKD PR2 Report, 2023).

- HTW students and lecturers both emphasized creating digital tools for easy ILS access, while recognizing students revert to third-party platforms instead of university-provided platforms for hybrid group work, emphasizing the need for enhanced technological ILS for hybrid learning on-site as well as developing a digital interactive campus map to help students and lecturers to navigate on campuses (cf. HTW PR2 Report, 2023).

- MRU students demonstrated less concern about study space occupancy due to consistent availability and stressed the significance of hybrid and virtual learning activities post-pandemic, supporting students who work next to studying. This is also recognized by their lecturers, which is why group work is often taken place in the hybrid/virtual space, although some lecturers sense lack of social interactions in the virtual space (cf. MRU PR2 Report, 2023).

- SAP students showed interest in improving Wi-Fi access and increasing suitable ILS while students and lecturers both prefer in-person learning despite acknowledging the benefits of hybrid and virtual learning activities. Although it is believed that online platforms can significantly broaden students' knowledge and interactions within a physical space, it must be worked on its feasibility (cf. SAP PR2 Report, 2023)

- UWK students focused on using virtual whiteboards and interactive maps to connect students in physical or hybrid spaces and suggested improvements for communication forums and platforms to find ILS on campus. Lecturers' recommendations include creating virtual replicas of physical spaces to facilitate interaction and using digital tools for collaboration (cf. UWK PR2 Report, 2023).

Overall, students and lecturers across universities had a collective focus on improving information dissemination about ILS, enhancing physical ILS, and adapting teaching and learning methods to hybrid learning environments. While various of online platforms are used for collaboration, the differences in needs and preferences reflected unique contexts and student requirements. **The overarching goal remained consistent: enhancing accessibility, promoting collaboration, and adapting to virtual learning tools to suit diverse student needs.**

4.3.   Conclusion qualitative data analysis

Overall, 34 students and 32 lecturers were interviewed in the FGI across partner universities (see Table 24):

Table 24: Overview of all focus group participants

Institution	Focus Groups & Participants	Total # Participants
AKD	FG 1: 11 students; FG 2: 7 lecturers	18
HTW	FG 1: 5 students; FG 2: 4 lecturers	9
MRU	FG 1: 5 students; FG 2: 5 lecturers	10
SAP	FG 1: 6 students; FG 2: 8 lecturers	14
UWK	FG 1: 7 students; FG 2: 8 lecturers	15
Total	FG 1: 34 students; FG 2: 32 lecturers	66

Comparing the results of the focus groups with students versus with lecturers across all partner universities, the following key take-aways within the investigated themes can be drawn:

➤ *Impact of the used informal or non-conventional learning spaces on students' / lecturers' knowledge acquisition and satisfaction with support and the learning environment:*

Both students and lecturers seem to share similar knowledge concerning the use of existing ILS on campuses. Concerning indoor spaces, seminar rooms are consistently prioritized for both study types, while particularly libraries are predominantly used for FL. Parks and green areas are popular outdoor spaces according to students and lecturers. There is a greater knowledge for indoor than outdoor spaces, while both were identified to have room for improvement. Weaknesses regarding the availability, particularly the lack of creative and collaborative indoor spaces, and outdoor spaces specifically for FL, as well as the general accessibility of ILS, have been identified. Hence, satisfaction levels between students vary, which is why lecturers believe many students are currently outsourcing ILS outside campuses.

➤ *Existing inequalities and barriers related to informal or non-conventional learning spaces, including access to technical equipment, internet and physical-spatial environments conducive to learning and well-being:*

The FGI showed that there is an underutilization of ILS since existing spaces are often unsuitable for learning due to quality barriers (instead of quantity) of ILS.

Concerning **quality barriers** of existing ILS students and lecturer identified limitations in technological infrastructure (i.e. shortage of power plugs, challenges with Wi-Fi-connectivity, deficiencies in technical equipment) as a main barrier. Additionally, according to students, the

quality of indoor ILS is mainly reduced due to high noise levels, inadequate temperature, lack of privacy, uncomfortable ergonomics, and poor air quality (e.g. due to kitchen odours). Lecturers added weaknesses, such as unsuitable lighting, ventilation, and a lack of creative and collaborative spaces. In addition, both focus groups identified a key issue with outdoor ILS: their lack of weatherproofing, resulting in their underutilization.

Next to quality barriers of existing ILS, **weaknesses in ILS' accessibility** were discussed in both focus groups. Here students identified barriers related to restricted access, lack of transparency in unlocking spaces, and insufficient information on schedules and room occupancy. Further, limited accessibility due to frequent occupancy, overcrowding, and restrictive regulations on food consumption or noise levels were mentioned. Lecturers recognized similar barriers but viewed opening hours less problematic compared to students, indicating differences in users' (students) versus observers' (lecturers) perspectives.

Specifically, **barriers for SWFO** were identified and discussed in the FGI with students. Financial constraints emerged as a primary barrier, impacting SWFO's ability to balance work and study, reducing time on campus for learning. Language barriers were noted, particularly for international students, affecting communication and resource access. Geographical barriers, such as long commuting times, were highlighted by SWFO from certain universities. Physical barriers, including limited visibility or mobility, were reported by SWFO at one university, emphasizing a lack of disability-friendly support.

Overall, students and lecturers across all partner universities emphasized that the key concern is not only the quantity but the quality of available ILS, whereas organizational barriers were perceived more prominently than infrastructure-related barriers. This highlights the need for improvements in both infrastructural and organizational aspects to enhance ILS for all students.

➢ *Students' and lecturers' perception on awareness and enabling strategies to deal with existing inequalities and barriers*

Students and lecturers across most partner universities believe there is awareness of barriers to ILS to some extend but proactive measures to address these issues are lacking in some cases. Communication challenges between different stakeholders and an awareness-action gap are common, emphasizing the need for improved communication and proactive strategies. Students of the FGI discussed various solutions and necessary measures that need to be taken, such as user-friendly booking systems, access with student IDs, creating mapping platforms to display information on ILS in order to improve access in a multifaceted way. Lecturers stress increased stakeholder commitment and participation, pilot projects, and an increased sustainable approach when promoting ILS on campuses.

➢ *Hybrid and virtual learning activities:*

The FGI showed that students and lecturers across various universities face common perspectives as well as challenges concerning hybrid and virtual learning activities. Students use particularly third-party online platforms (i.e., Zoom, Google Drive, etc.) for CL, thus, overcoming geographical barriers. Lecturers recognized both challenges and benefits of virtual learning and were increasingly incorporating digital tools to support hybrid group work while using virtual spaces as valuable extensions of the physical space. There are differences in specific needs and preferences among students, whereas the overarching goal to adapting to virtual tools in response to diverse student needs, promoting hybrid collaboration, a demand for improved guidance tools such as digital platforms that provide information on ILS on campuses, thus improving accessibility remains consistent for all partner universities.

5. Summary: Key findings on users' perspective

The NIILS Synthesis Report combines quantitative and qualitative findings on ILS usage, perception, and impact and investigated ILS' availability, accessibility, and user experiences across partner universities, while displaying disparities and commonalities among universities.

The quantitative results showed **strong variations among the samples across partner universities, yet the hypotheses are confirmed universally.** Profound similarities exist in the selection, use, availability, and accessibility of ILS, along with perceived obstacles on campuses. FL mainly occurs at home, CL occurs in diverse settings, and outdoor spaces are popular in all countries despite climatic differences. However, overall, **students seem not to profoundly differentiate between focused vs collaborative learning when choosing ILS**. This implies that **ILS should be tailored to accommodate both FL and CL activities**, emphasizing the importance of their **multifunctionality and flexibility in use**. **Strong relationships between ILS and positive university experiences,** emphasizing the need to improve access to collaborative spaces for inclusivity, were identified. In addition, quality and accessibility were identified as barriers, **necessitating improvements in ILS in both infrastructural and organizational aspects.**

Several outcomes of the quantitative part find correspondence in the qualitative results. Those showed that there is a shared knowledge among students and lecturers regarding ILS usage, emphasizing priorities like seminar rooms for both study types and libraries for particularly FL. **Barriers** related to technological and physical **infrastructure**, **restricted accessibility** to ILS, whereas **SWFO** face additional **financial**, language, geographical, and physical **constraints**, were identified, which is in alignment with the quantitative results.

While it is assumed that an awareness of barriers on behalf of the university management exists, proactive measures were criticised to be insufficient, requiring improved communication and strategies to promote ILS. Proposed **solutions included user-friendly digital systems supporting transparency on information and use of ILS on campuses,** as well as an **increased stakeholder commitment.** Regarding hybrid and virtual learning, students and lecturers shared the perspective **that virtual tools can support enhancing and extending the physical space**, thus, mitigating existing barriers and promoting hybrid collaboration. In addition, hybrid and **virtual tools can improve accessibility of physical spaces through digital platforms**.

In conclusion, the results show the crucial role of available and accessible ILS on campuses for students. It is recommended to address the barriers discussed, improve communication and participation among the respective stakeholders, and enhancing the opportunity to improve and extend the physical space with hybrid and virtual tools. The findings provide valuable insights for universities aiming to improve the higher education environment and support students' learning experiences.

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APPENDICES

List of Annexes

Appendix 1 – Student survey

ONLINE STUDENT SURVEY NIILS
New Approaches for Inclusive and Informal Learning Spaces

Languages (MANDATORY QUESTION)

Welcome to the online student survey "NIILS – New Inclusive and Informal Learning Spaces".

Please select the most suitable language: <u>English</u>

Bitte wählen Sie Ihre bevorzugte Sprache aus: <u>Deutsch</u>

Si prega di selezionare la lingua preferita: <u>Italiano</u>

Pasirinkite pageidaujamą kalbą: <u>Lietuvių</u>

Lütfen tercih ettiğiniz dili seçin: <u>Türkçe</u>

At which university do you study?

Single selection

☐   Akdeniz Üniversitesi, Turkey

☐   HTW Berlin, Germany

☐   Mykolo Romerio universitetas, Lithuania

☐   Sapienza Università di Roma, Italy

☐   Universität für Weiterbildung Krems, Austria

Welcome

Dear students,

Welcome to our online student survey NIILS!

Due to innovative technology learning can take place in different ways and at different places. **With this survey, we want to learn more about your learning activities and the selection and usage of learning places OUTSIDE seminars and lectures**, like in student lounges, libraries, cafés, or outdoor places on and off-campus.

The survey is divided into six thematic blocks:

1. Sociodemographic data,

2. Questions about your studies,

3. Focused Learning Activities,

4. Collaborative Learning Activities,

5. Hybrid Learning Activities,

6. University Campus.

You will need about 20 minutes to answer the questionnaire.

The findings of this survey are embedded in the European research project NIILS – New Approaches for Inclusive Informal Learning Spaces and are supplemented by further observations and analyses.

Thank you very much for your interest and your participation!

If you have questions about the project or further questions, please contact:

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Privacy (MANDATORY QUESTION)

Data protection

This survey is anonymous and therefore falls outside the scope of the GDPR (Recital 26).

In the following survey, there is no link to specific personal data within the framework of the research project. Beyond that, no IP address storage takes place nor are Google Analytics or cookies activated. Due to the anonymity of this survey, it is not possible to inform about individual data records or to correct, exclude from processing, delete, or export individual data records.

Participation in the survey is voluntary. Registration is not required for participation.

The survey is conducted for research purposes within the framework of the European research project NIILS – New Approaches for Inclusive Informal Learning Spaces. Only anonymized data will be collected, processed, and stored.

❏ I have acknowledged this information and would like to participate in the survey.

1. Sociodemographic data

1.1. Please tell us your age.

Single selection.

□ up to 20 years

□ 21-25 years

□ 26-30 years

□ 31-35 years

□ 36-40 years

□ 41-45 years

□ 46-50 years

□ 51-55 years

□ 56-60 years

□ more than 61 years

1.2. What best describes your gender?

Single selection.

□ Female

□ Male

□ Diverse

□ Prefer not to say

1.3. Where do you live?

Multiple selection.

□ Student dormitory

□ Sharing a flat with others

□ At parents´ /relatives´ house

□ With my partner/husband/wife

□ I live alone in my own apartment.

□ Room for sublease

1.4. Do you live in a household with minor children or persons in need of care?

Single selection.

□ Yes

□ No

1.5. What is the distance from your home to your university?

Single selection.

□ 0-4 km

☐ 5-10 km

☐ 11-30 km

☐ 31-60 km

☐ 61-100 km

☐ 101-200 km

☐ more than 200 km

1.6.   We are interested in the special situation of students with fewer opportunities. Challenges might arise out of diseases, cultural differences, or economic obstacles.

Are there any personal challenges you are facing as a student?

Multiple selection

☐ Physical impairment (e.g. mobility, visual, auditive)

☐ Chronic somatic disease (e.g. multiple sclerosis, cancer, diabetes)

☐ Mental disease (e.g. Burnout)

☐ Learning disabilities (e.g. Dyslexia, Dyscalculia, ADHD)

☐ Cultural differences (e.g. different cultural background to my university)

☐ Language (I do not study in my mother tongue.)

☐ Economic obstacles (e.g. financial barriers)

☐ Need to work for living while studying

☐ Family related obstacles (e.g. responsible for children or nursing cases)

☐ Geographic obstacles (e.g. remote residence)

☐ Age

☐ Other: _

☐ None of these

2.   Questions about your studies

2.1.   Which degree are you aiming to achieve with your current studies?

Single selection.

☐ Associate's Degree (like two-year college degree, short-term degree)

☐ Bachelor

☐ Master

☐ PhD

☐ Other: _

2.2.   Do you study full-time or part-time?

Single selection.

☐ Full-time student

☐   Part-time student

2.3.   **According to which study model do you study?**

Single selection.

☐   Study on campus

☐   Part-time study with regular attendance phases at the university campus

☐   Distance learning without any presence offers on campus

☐   Distance learning with presence offers on campus

☐   Other: _

2.4   **How much time per week do you spend on your studies on average (lectures, self-studies and exams combined)? Please take into account the last four weeks of your study.**

               Single selection.

☐   up to 5 hours per week

☐   6-10 hours per week

☐   11-15 hours per week

☐   16-20 hours per week

☐   21-30 hours per week

☐   more than 30 hours per week

2.5   **When did you get enrolled at your current university for the first time?**

Single selection from the dropdown list.

☐   dropdownlist 2022, 2021, 2020, 2019, 2018 …. 2012, before 2012)

2.6   **What is your field of study?**

Multiple selection

☐   Education

☐   Arts and Humanities

☐   Social Sciences, Journalism, and Information

☐   Business, Administration and Law

☐   Natural Sciences, Mathematics and Statistics

☐   Information and Communication Technologies

☐   Engineering, Manufacturing and Construction

☐   Agriculture, Forestry, Fisheries and Veterinary

☐   Health and Welfare

☐   Services

☐   Other: _

3. Focused learning activities

The following questions aim to understand which informal places you choose and use when you are studying on your own - OUTSIDE seminars and lectures.

Please think about your FOCUSED LEARNING ACTIVITIES in this section, which you conduct individually and usually undisturbed.

This can be the following learning activities: reading, writing, preparation, and repetition or studying for exams.

3.1. Which places do you use for focused learning activities and how often? Please answer the question thinking about the last month of your studies.

Single selection per row of the matrix.

	very often	often	occasionally	rarely	never	does not apply
The place where I live						
Friends' house						
Seminar rooms						
Interim spaces on campus (floor, entrance hall, niches, auditorium vestibules)						
Student lounges / working areas on campus						
University canteen / cafeteria on campus						
University library						
Outdoor places on campus						
Public library						
Public transportation						
Café						
Nature (e.g., park, beach, forest, lake)						
Temporary accommodation (i.e., hotel, guesthouse, etc.)						
Other + text						

3.2. **Are there any other places on campus you would like to use for focused learning activities, but you don't have access?**

Single selection.

☐   Yes

☐   No

3.3. **Please tell us which places you would like to use for focused learning activities?**
       Free answer (FILTER: only if 3.4 is answered with YES)

Text

3.4. **Availability of places for focused learning activities**

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
If I want to study on my own, I know where I can go in my university.						
There is the opportunity to study on my own at the campus of my university.						
There are enough places for focused learning activities at my university.						

3.5. **Accessibility of places for focused learning activities**

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
Places for focused learning activities are open to all students at my university.						
Places for focused learning activities are easily accessible at my university.						

If I want to study on my own, I can find a place at my university at short notice.					
I can reach learning places for focused learning activities without any barrier.					

3.6. **What are the obstacles of using places in which you can study on your own?**
Multiple selection.

☐   Opening hours

☐   Registration

☐   Limited availability (e.g., too crowded)

☐   Difficult to access (e.g., physical barriers, controlled access)

☐   Other + text

3.7. **Satisfaction**

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
I am satisfied with the places for focused learning activities on the campus of my university.						
I feel comfortable at places for focused learning activities on the campus of my university.						

4. Collaborative learning activities

The following questions aim to understand which informal places you choose and use when you are studying in groups with your fellow students - OUTSIDE seminars and lectures.

Please think about your COLLABORATIVE LEARNING ACTIVITIES in this section, which you conduct in groups.

These can be the following learning activities: group work, preparing a group presentation, preparation and repetition or studying for exams.

4.1.   Which physical places do you use for collaborative learning activities and how often? Single selection per row of the matrix.

	very often	often	occasionally	rarely	never	does not apply
The place where I live						
Friends' house						
Seminar rooms						
Interim spaces on campus (floor, entrance hall, niches, auditorium vestibules)						
Student lounges / working areas on campus						
University canteen / cafeteria on campus						
University library						
Outdoor places on campus						
Public library						
Public transportation						
Café						
Nature (e.g., park, beach, forest, lake)						
Temporary accommodation (i.e., hotel, guesthouse, etc.)						
Other + text						

4.2.   Are there any other places on campus you would like to use for collaborative learning activities, but you don't have access?

Single selection.

☐   Yes

☐   No

4.3.   Please tell us which places you would like to use for collaborative learning activities?
Free answer (FILTER: only if 4.4 is answered with YES)

Text

4.4. Availability of places for collaborative learning activities

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
If I want to study together with my fellow students, I know where I can go in my university.						
There is the opportunity to study together in groups with other students at the campus of my university.						
There are enough places for studying in groups on campus of my university.						

4.5. Accessibility of places for collaborative learning activities

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
Places for studying in groups are open to all students at my university.						
Places for studying in groups are easily accessible at my university.						
If we want to study in groups, we can find a place at my university at short notice.						
I can reach learning places for collaborative learning activities without any barrier.						

4.6. What are the obstacles of using places in which you can study in groups?

Multiple selection.

□   Opening hours

□   Registration

□   Limited availability (e.g., too crowded)

□   Difficult to access (e.g., physical barriers, controlled access)

□   Other + text

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the European Union

4.7. Satisfaction

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
I am satisfied with the places for collaborative learning activities on the campus of my university.						
I feel comfortable at places for collaborative learning activities on the campus of my university.						

5. Hybrid learning activities

Due to the integration of information and communication technology it is possible to learn anytime and anyplace. In this context we would like to learn more about your preferences.

5.1. Which devices do you have available for your studies?

Multiple Selection.

☐ Laptop / Notebook / Netbook

☐ Smartphone

☐ Tablet

☐ E-Book Reader

☐ Other + text

5.2. Do you have access to WIFI on the campus of your university?

Single selection.

☐ Yes

☐ No

☐ Partly (not everywhere / not anytime)

☐ I do not know

5.3. WIFI quality on campus

Single selection.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
I am satisfied with the WIFI quality on campus						

5.4. **Which virtual places do you use for your learning activities outside seminars and lectures and how often?**

Single selection per row of the matrix.

	very often	often	occasionally	rarely	almost never	doesn't exist	no answer
Learning Management System (i.e., Moodle, Ilias, Canvas, Blackboard, etc.)							
Video communication (i.e., Zoom, MS Teams, Skype, etc.)							
Messenger services (i.e., WhatsApp, Telegram, etc.)							
Social Media (Facebook, Instagram, Twitter, etc.)							
Online Forum							
Onlinechat							
Online document management platforms (Google Docs, Dropbox, OneDrive, etc.)							
Augmented / Virtual Reality (AR/VR/XR)							
Other + text							

5.5. **What are obstacles to use technology at your university campus?**
Multiple selection.

☐ Complexity

☐ Inconvenience

☐ Lack of knowledge

☐ Lack of infrastructure (e.g., availability of plugs)

☐ Technology isn't working

☐ Outdated technology

☐ Not confident enough

☐ Lack of technical support

☐ Nothing

☐ Other + text

6. University Campus

6.1. How important is it to you…

Single selection per row of the matrix.

	very important	important	neutral	less important	not important	no answer
…to study alone on the university campus?						
…to study together in groups on the university campus?						
Other + text						

6.2. Is it possible for you to use seminar rooms and lecture halls OUTSIDE the seminars for self-study (on your own as well as in groups)?

Multiple selection.

□   Yes

□   No

□   Partly

□   Upon request

6.3. Satisfaction university campus

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
I like to study at the campus of my university.						
I like the atmosphere at the university campus.						
I feel comfortable at places for learning activities on the campus of my university.						
I think the places for students at my university support studying.						
The places for studying in my university motivate me to study more.						
I would recommend my university to other students.						
Other + text						

6.4. Belongingness to your university

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
I would be happy to pursue another degree at my university.						
I think that I could easily become as attached to another university as I am to this one.						
I do not feel like 'part of the family' at my university.						
I do not feel 'emotionally attached' to this university.						
This university has a great deal of personal meaning for me.						
I feel a 'strong' sense of belonging to my university.						
Other + text						

6.5. Satisfaction with interpersonal relationships

Single selection per row of the matrix.

	totally agree	agree	neither agree nor disagree	disagree	totally disagree	no answer
My interpersonal relationships with students have positively influenced my intellectual growth and interest in ideas.						
I have developed close personal relationships with other students.						
The student friendships I have developed have been personally satisfying.						
My personal relationships with other students have positively influenced my personal growth, values, and attitudes.						

It has been easy for me to meet and make friends with students.						
Most students at this university have values and attitudes similar to mine.						
Other + text						

6.6. Well-being

Please indicate for each of the 5 statements which are closest to how you have been feeling over the past 2 weeks

Over the past 2 weeks…	All of the time	Most of the time	More than half the time	Less than half the time	Some of the time	At no time
I have felt cheerful and in good spirits	5	4	3	2	1	0
I have felt calm and relaxed	5	4	3	2	1	0
I have felt active and vigorous	5	4	3	2	1	0
I woke up feeling fresh and rested	5	4	3	2	1	0
My daily life has been filled with things that interest me	5	4	3	2	1	0

7. Personal comments

What are your expectations, needs or suggestions regarding informal learning spaces on/around your campus?

Please use the following text field:

TEXT

8. Acknowledgement

Thank you for your time and support!

Please do not hesitate to contact us if you have any questions!

Appendix 1.1 Descriptive Statistics

Appendix 1.1.1 Living situation

Differences living places
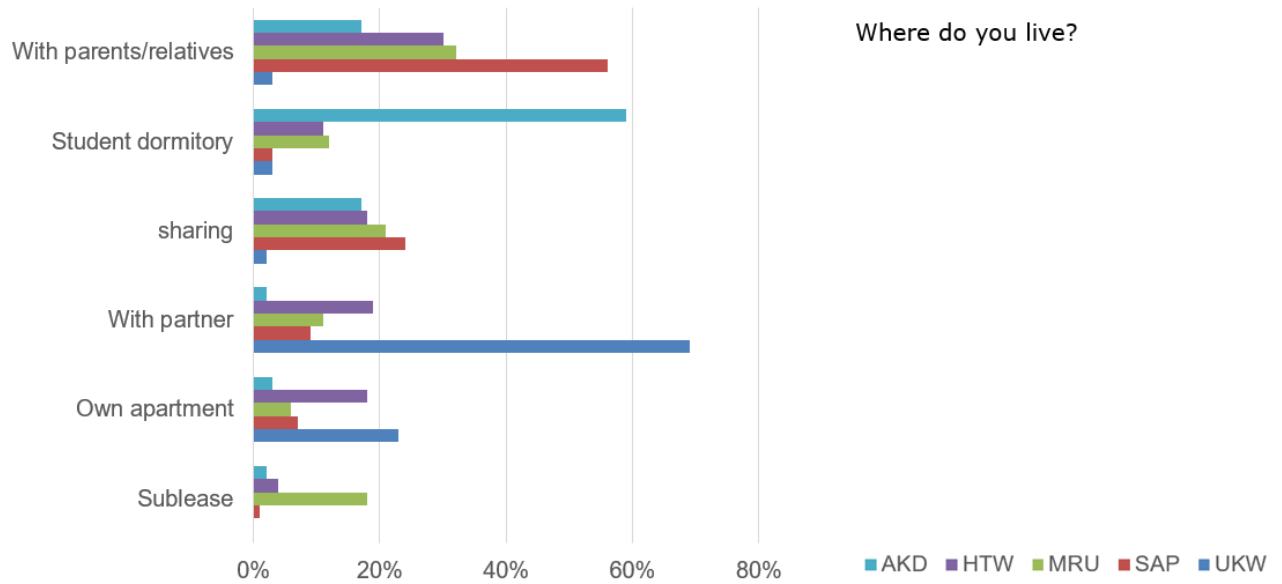
Appendix 1.1.2 Personal challenges of SWFO

Differences SWFO
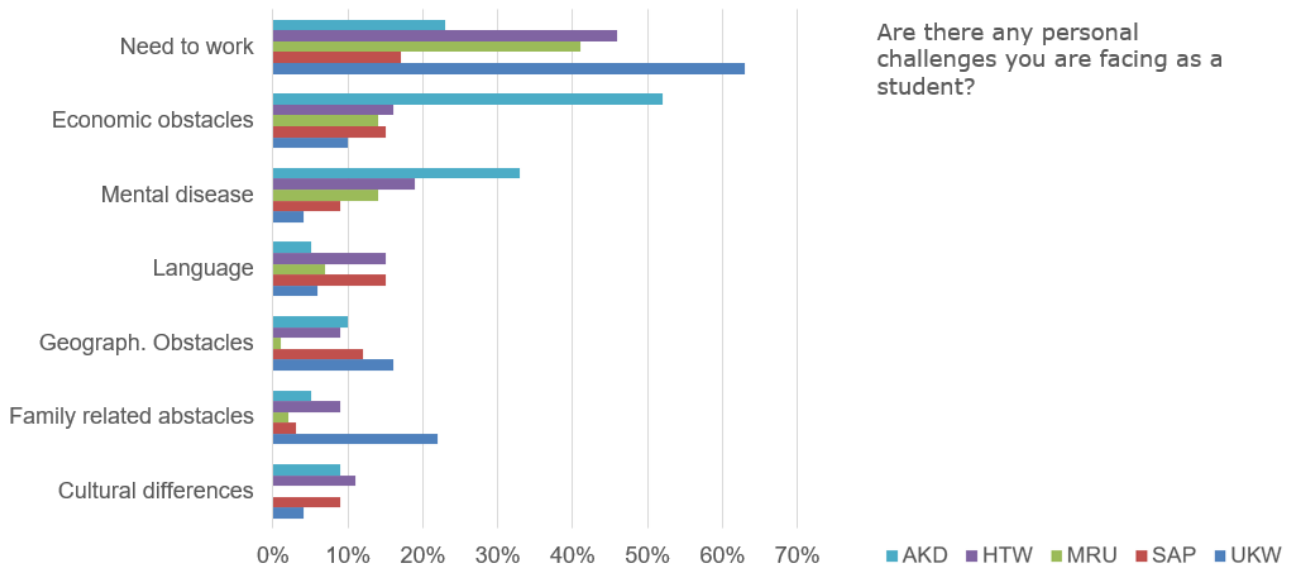
Appendix 1.1.3 ILS – focused learning activities

ILS focused learning – private/campus

Which places do you use for **focused learning activities** and how often?
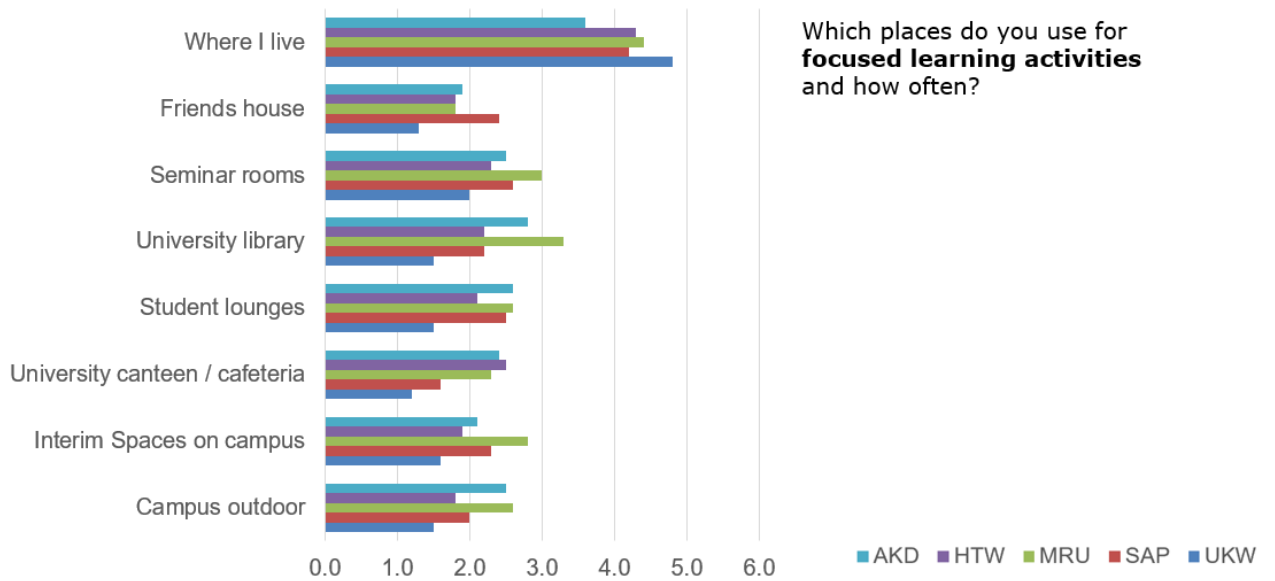
Appendix 1.1.4 ILS – focused learning obstacles

ILS focused learning – Obstacles

Obstacles to use **focused learning spaces (on campus)**
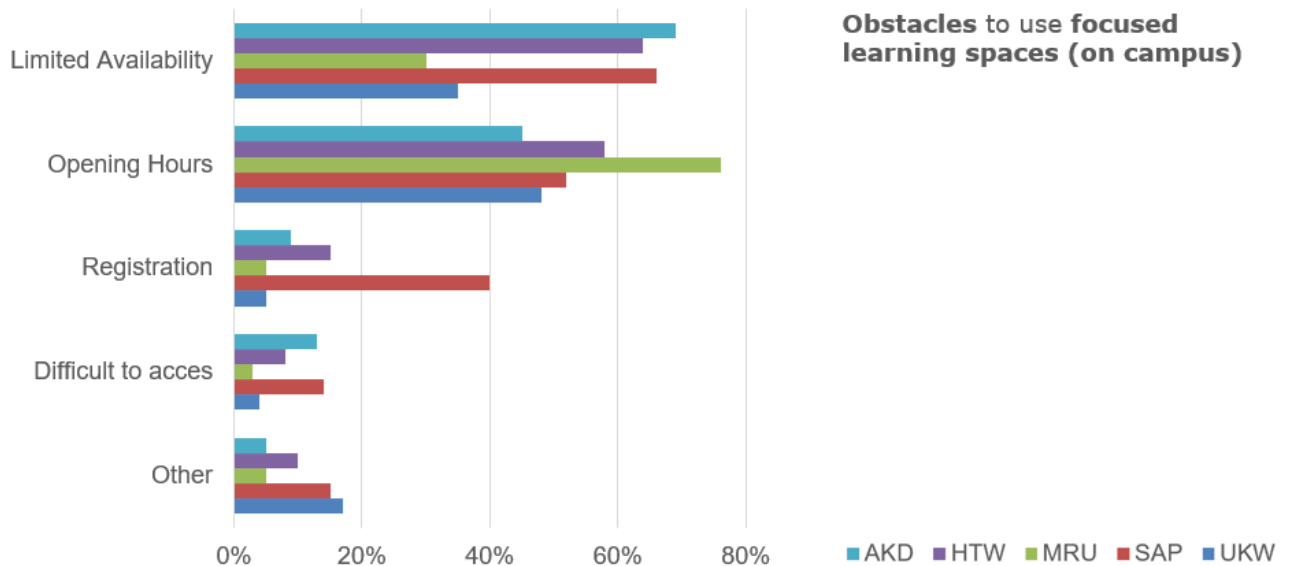
Appendix 1.1.5 ILS – collaborative learning activities

ILS collaborative learning – private/campus

Which places do you use for **collaborative learning** activities and how often?

Categories: Where I live, Friends house, Seminar rooms, University library, Student lounges, University canteen / cafeteria, Interim Spaces on campus, Campus outdoor

Legend: AKD, HTW, MRU, SAP, UKW
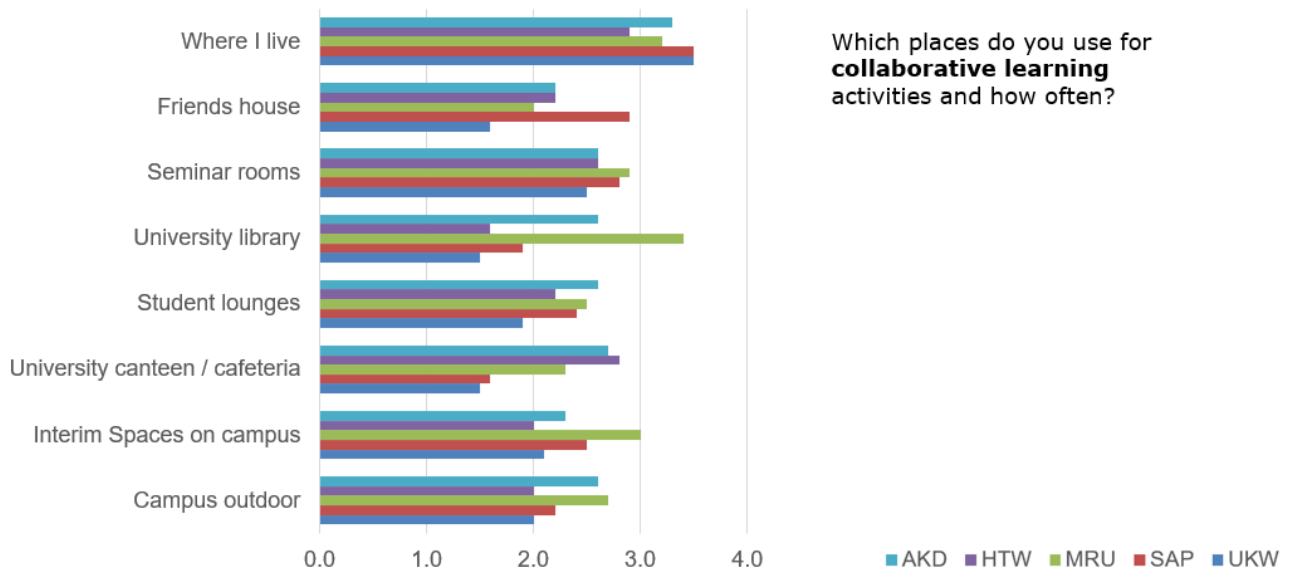
Appendix 1.1.6 ILS – collaborative learning obstacles

ILS collaborative learning – Obstacles

Obstacles to use **collaborative learning spaces (on campus)**

Categories: Limited Availability, Opening Hours, Registration, Difficult to acces, Other

Legend: AKD, HTW, MRU, SAP, UKW
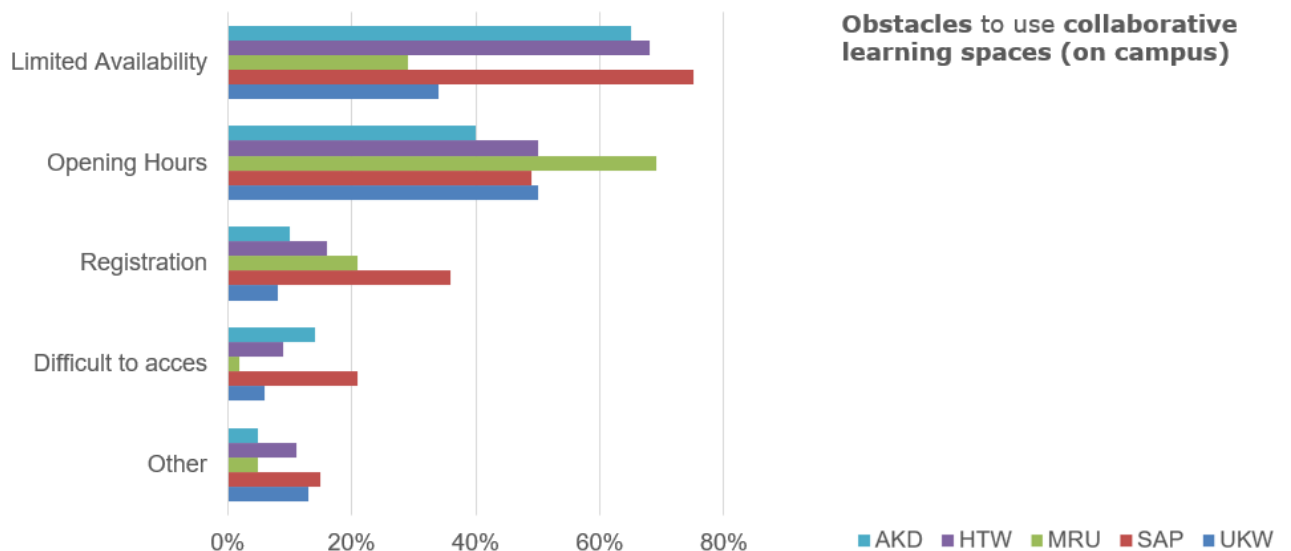
Appendix 1.2 – Item and scale analysis for every university

Appendix 1.2.1 Overview of all universities

Name of Scale	Number of Items	Mean	Distribution	Corrected Item-total-correlation	Reliability of scale (Cronbachs Alpha)
FL_Availability	3	ok	ok	ok	0.82
FL_Accessibility	4	ok	ok	ok, except FL_AC_2 0.81, alpha without FL_AC_2 0.79, accepted	0.87
FL_Satisfaction	2	ok	ok	ok	0.83
CL_Availability	3	ok	ok	ok, except CL_AV_2 0.81, alpha without FL_AV_2 0.78, accepted	0.87
CL_Accessibility	4	ok	ok	ok, except CL_AC_2 0.84, alpha without CL_AC_2 0.84, accepted	0.90
CL_Satisfaction	2	ok	ok	ok	0.85
Social Integration (satisfaction with interpersonal relationships)	6	ok	ok	ok	0.89
Affective commitment (sense of belonging to your university)	6	ok	ok	ok, except B_U_2 0.13, alpha without B_U_2 0.80, new scale except B_U_2	0.76 (6 item scale) 0.80 (5 item scale)
Well-being	5	ok	ok	ok	0.89
Satisfaction university campus	6	ok	ok	ok	0.89

Notes: In the survey we used scale names which are easy to understand. If these are not aligned to the scientific scale names used in the survey they are written in brackets.

Appendix 1.2.2 Akdeniz University Antalya

Name of scale	Number of items	Mean	Distribution	Corrected Item-total-correlation	Reliability of scale (Cronbachs Alpha)
FL_Availability	3	ok	ok	ok	0.76
FL_Accessibility	4	ok	ok	ok, except FL_AC_2 0.81, reliability without FL_AC_2 0.76, accepted	0.87
FL_Satisfaction	2	ok	ok	ok	0.82
CL_Availability	3	ok	ok	ok	0.84
CL_Accessibility	4	ok	ok	ok, except CL_AC_2 0.85, reliability without CL_AC_2 0.83	0.89
CL_Satisfaction	2	ok	ok	ok	0.85
Social Integration (satisfaction with interpersonal relationships)	6	ok	ok	ok	0.88
Affective commitment (sense of belonging to your university)	6	ok	ok	not ok, B_U_2 -0.13, reliability without B_U_2 0.75	0.63 (6 item scale) 0.75 (5 item scale)
Well-being	5	ok	ok	ok, except W_1 0.82 and W_3 0.83, accepted	0.89
Satisfaction university campus	6	ok	ok	ok	0.87

Appendix 1.2.3 HTW Berlin

Name of scale	Number of items	Mean	Distri-bution	Corrected Item-total-correlation	Reliability of scale (Cronbachs Alpha)
FL_Availability	3	ok	ok	ok	0.81
FL_Accessibility	4	ok	ok	ok	0.85
FL_Satisfaction	2	ok	ok	ok	0.83
CL_Availability	3	ok	ok	ok, except CL_AV_2 0.80, alpha without CL_AV_2 0.77, accepted	0.87
CL_Accessibility	4	ok	ok	ok, except CL_AC_2 0.82, alpha without CL_AC_2 0.83	0.88
CL_Satisfaction	2	ok	ok	ok	0.85
Social Integration (satisfaction with interpersonal relation-ships)	6	ok	ok	ok	0.89
Affective commitment (sense of belonging to your univer-sity)	6	ok	ok	ok, except B_U_2 0.24, alpha without B_U_2 0.79	0.76 (6 item scale) 0.79 (5 item scale)
Well-being	5	ok	ok	ok	0.87
Satisfaction university campus	6	ok	ok	ok	0.90

Appendix 1.2.4 Mykolo Romerio universitetas – Vilnius

Name of scale	Nr. items	Mean	Distri-bution	Corrected Item-total-correlation	Reliability of scale (Cron-bach)
FL_Availability	3	ok, except FL_AV_1 and FL_AV_2 mean > 4.2	ok	ok, except FL_AV_1 0.82, alpha without FL_AV_2 0.84 and FL_AV_2 0.84, alpha without FL_AV_2 0.84	0.90
FL_Accessibility	4	ok, except FL_AC_1 and FL_AC_2 and FL_AC_1 and FL_AC_3 mean > 4.2	ok	ok, except FL_AC_3 0.81, alpha without FL_AC_3 0.83	0.89
FL_Satisfaction	2	ok	ok	not ok: FL_S_1 0.87, and FL_S_2 0.87	0.93
CL_Availability	3	ok, except CL_AV_1 and CL_AV_2 mean > 4.2	not ok	ok, except CL_AV_1 0.81, alpha without FL_AV_1 0.84 and CL_AV_2 0.81, alpha without CL_AV_1 0.85 and	0.90
CL_Accessibility	4	ok, except CL_AC_1 and CL_AC_2 mean > 4.2	not ok	Not ok, CL_AC_1 0.86, alpha without item 0.94; CL_AC_2 0.91, alpha without item 0.93; CL_AC_3 0.90, alpha without item 0.93; CL_AC_4 0.87, alpha without item 0.94	0.95
CL_Satisfaction	2	Ok, except CL_Satis-faction_1 mean > 4.2	ok	Not ok, CL_Satisfaction_1 0,82, and CL_Satisfaction_2 0.82	0.83
Social Integra-tion (satisfaction with interper-sonal relation-ships)	6	ok	ok	ok	0.89
Affective com-mitment (sense of belonging to your university)	6	ok	ok	ok, except B_U_2 0.26, alpha without B_U_2 0.79	0.77 (6 item scale) 0.79 (5 item scale)
Well-being	5	ok	ok	ok, except W_3 0.82, accepted	0.92
Satisfaction uni-versity campus	6	ok	ok	ok, except S_U_C_1 0.83, alpha without item 0.90 and except S_U_C_2 0.81, alpha without item 0.90 and except S_U_C_3 0.81, alpha without item 0.90 and except S_U_C_4 0.82, alpha without item 0.90	0.92

Appendix 1.2.5 Sapienza Università – Rome

Name of scale	Number of items	Mean	Distribu-tion	Corrected Item-total-correlation	Reliability of scale (Cronbachs Alpha)
FL_Availbility	3	ok	ok	ok	0.81
FL_Accessibility	4	ok	ok	ok	0.82
FL_Satisfaction	2	ok	ok	ok	0.70
CL_Availability	3	ok	ok	ok, except CL_AV_2 0.82, alpha without FL_AV_2 0.74	0.86
CL_Accessibility	4	ok	ok	ok	0.83
CL_Satisfaction	2	ok	ok	ok	0.76
Social Integration (satisfaction with interpersonal relationships)	6	ok	ok, except S_IR_2	ok	0.89
Affective commitment (sense of belonging to your university)	6	ok	ok	ok, except B_U_2 0.25, alpha without B_U_2 0.87	0.84
Well-being	5	ok	ok	ok	0.87
Satisfaction university campus	6	ok	ok	ok	0.89

Appendix 1.2.6 Donau-Universität – Krems

Name of scale	Number of items	Mean	Distri-bution	Corrected Item-total-correlation	Reliability of scale (Cronbachs Alpha)
FL_Availability	3	ok	ok	ok	0.78
FL_Accessibility	4	ok	ok	ok, except FL_AC_1 0.82, alpha without FL_AC_2 0.88; and FL_AC_2 0.90, alpha without FL_AC_2 0.86	0.91
FL_Satisfaction	2	ok	ok	ok	0.82
CL_Availability	3	ok	ok	ok, except CL_AV_1 0.85, alpha without CL_AV_2 0.85; and CL_AV_2 0.84, alpha without CL_AV_2 0.86	0.91
CL_Accessibility	4	ok	ok	ok, except CL_AC_1 0.87, alpha without CL_AC_2 0.90; and CL_AC_2 0.87, alpha without CL_AC_2 0.70	0.96
CL_Satisfaction	2	ok	ok	not ok, CL_Satisfaction_1 0.81, and CL_Satisfaction_2 0.81	0.89
Social Integration (satisfaction with interpersonal relationships)	6	ok	ok	ok	0.89
Affective commitment (sense of belonging to your university)	6	ok	ok	ok, except B_U_2 0.17, alpha without B_U_2 0.82	0.78
Well-being	5	ok	ok	ok, except W_2 0.87 and W_3 0.85, accepted	0.90
Satisfaction university campus	6	ok	ok	ok	0.88

Appendix 1.3 Hypotheses across all universities

Appendix 1.3.1 H1a-d

		effect sizes			
		H1a Sense of Belonging (Commitment)	H1b Interpersonal Relationships	H1c Well-Being	H1d University Campus Satisfaction
AKD	Availability	supported	supported	supported	supported
	Accessibility	supported	supported	supported	supported
HTW	Availability	supported	supported	supported	supported
	Accessibility	supported	supported	supported	supported
MRU	Availability	supported	supported	supported	supported
	Accessibility	supported	supported	supported	supported
SAP	Availability	supported		supported	supported
	Accessibility	supported	supported	supported	supported
UWK	Availability	supported	supported		supported
	Accessibility	supported	supported	supported	supported
all universities	Availability	supported	supported	supported	supported
	Accessibility	supported	supported	supported	supported

	large effect size	r > 0,5
	medium effect size	r between 0,3 and 0,5
	small effect size	r between 0,1 and 0,3
	no effect	r < 0,1

		significance				
		H1a Sense of Belonging (Commitment)	H1b Interpersonal Relationships	H1c Well-Being	H1d University Campus Satisfaction	
AKD	Availability	supported	supported	supported	supported	n = 334
	Accessibility	supported	supported	supported	supported	
HTW	Availability	supported	supported	supported	supported	n = 327
	Accessibility	supported	supported	supported	supported	
MRU	Availability	supported	supported	supported	supported	n = 105
	Accessibility	supported	supported	supported	supported	
SAP	Availability	supported			supported	n = 152
	Accessibility	supported			supported	
UWK	Availability	supported	supported		supported	n = 115
	Accessibility	supported	supported		supported	
all universities	Availability	supported	supported	supported	supported	n = 1037
	Accessibility	supported	supported	supported	supported	

	supported	p ≤ 0,05
		n.s. (p > 0,05)

Appendix 1.3.2 H2

			significance	effect sizes		
			H2			
AKD	Availability	FL > CL	supported	no information		n = 334
	Accessibility	FL > CL	supported	no information		
	Satisfaction	FL > CL	not significant	no information		
HTW	Availability	FL > CL	not significant	no effect		n = 327
	Accessibility	FL > CL	supported	small effect		
	Satisfaction	FL > CL	not significant	no effect		
MRU	Availability	FL > CL	not significant	no effect		n = 105
	Accessibility	FL > CL	not significant	no effect		
	Satisfaction	FL > CL	supported	small effect		
SAP	Availability	FL > CL	not significant	small effect		n = 152
	Accessibility	FL > CL	supported	small effect		
	Satisfaction	FL > CL	not significant	no effect		
UWK	Availability	FL > CL	sign. CL > FL	small effect		n = 115
	Accessibility	FL > CL	not significant	no effect		
	Satisfaction	FL > CL	not significant	small effect CL > FL		
all universities	Availability	FL > CL	supported	no effect		n = 1037
	Accessibility	FL > CL	supported	small effect		
	Satisfaction	FL > CL	not supported	no effect		

	large effect size	r > 0,5
	medium effect size	r between 0,3 and 0,5
	small effekt size	r between 0,1 and 0,3
	no effect	r < 0,1
supported	p ≤ 0,05	
	n.s. (p > 0,05)	

Appendix 2 – Focus groups interviews

Appendix 2.1 – Interview guide: FGI with students

Questions for the focus group interviews with students

Duration of focus groups: 100 minutes

In advance	**In advance, students get the campus maps, information regarding the project, and aspects which will be discussed in the focus groups** One/two weeks before the focus group: Contact the participants and ➢ Definition of informal learning spaces and focused/collaborative learning, ➢ ask them to fill out the survey (Word, PDF, paper & pencil) ➢ ask them to take pictures of their preferred learning places on campus ➢ send the Consent Form
Welcome, presentation of the project, agenda for the focus group	**15 min** Welcome! - Project NIILS (informal, inclusive learning environments) - Participants with fewer opportunities - Voluntariness, anonymity, confidentiality of all statements Short self-presentation of participants (warm-up,) Name, study program, semester, where do I live, Show your picture(s) of your preferred learning places on campus
c) **used informal or non-conventional learning spaces** on students' knowledge acquisition: **Satisfaction** with the support and the learning environment **Map and Photos at MURAL-Board**	**Informal learning environments (20 min)** Definition "Informal learning spaces, […], are places of learning which can be selected independently by differentiated and self-organizing actors […]." (translated from Ninnemann & Jahnke, 2018, p.141) What places do you use for learning activities? ➢ a map of the campus and mapping of the important learning places ➢ Photos of preferred learning spaces on campus ➢ green cards for focused learning activities ➢ blue cards for collaborative learning activities ***find the Link to the MURAL Board at the end of this document** In-depth questions (supported quantitatively, if necessary, or via point polling on the facilitation wall/flipchart): ➢ red dots for important places to learn ➢ Frequency of use in the last four weeks (favorite or most important place to learn?) ➢ Satisfaction with the most important/most frequently used learning location (strengths/weaknesses)

d) Existing **inequalities and barriers** related to informal or non-conventional learning spaces, including access to technical equipment and the internet as well as to physical-spatial environments conducive to learning and well-being	**In-depth inequalities and barriers (20 min)** ➢ Look at the most frequently / preferred learning places and tell us about the existing barriers: ➢ What are the barriers that you face in accessing informal learning spaces? 　o Possible answers: opening hours, registration /controlled access, physical barriers) ➢ Are there any obstacles regarding the availability of informal learning spaces? 　o Possible answers: not enough places, too crowded, environmental factors (light, temperature, acoustic, air), atmosphere/well-being, technological infrastructure (plugs, wifi) ➢ In the project, we also focus on students with "fewer opportunities". We have a broad perception of fewer opportunities, including a wide range of aspects: Physical impairment (e.g. mobility, visual, auditive); Chronic somatic disease (e.g. multiple sclerosis, cancer, diabetes); Mental disease (e.g. Burnout); Learning disabilities (e.g. Dyslexia, Dyscalculia, ADHD); Cultural differences (e.g. different cultural background to my university); Language (I do not study in my mother tongue.); Economic obstacles (e.g. financial barriers); Need to work for a living while studying; Family-related obstacles (e.g. responsible for children or nursing cases); Geographic obstacles (e.g. remote residence); Age: Think again, what are the barriers? What have you experienced yourselves?
e) Students' and lecturers' **awareness and enabling strategies** to deal with existing inequalities and barriers	**Awareness and existing strategies to decrease inequalities (15 min)** ➢ What do you think: Are your lecturers and the university administration know these barriers? ➢ Are you aware, or do you know if anything is being done to break down these barriers? ➢ What could be done in the future to reduce these barriers?
Hybrid and virtual learning activities	**Definition Hybrid Activities:** combining activities concerning space (physical <u>and</u> virtual spaces) and time (synchronous <u>and</u> asynchronous activities; see Reinmann, 2021, S. 4) *Examples:* students meet partly physical and remote to discuss a presentation (e.g. Zoom), and students work together on a document (e.g. file sharing). Students get course material after class via the university provided learning platform (e.g. Moodle) **Hybrid and virtual learning activities (20 min)** Hand out the following questions as a questionnaire or prepare them in the MURAL Board or on the moderation wall. In-depth questions:

	1. Can integrating services in the virtual space (apps, etc.) help you overcome barriers you are facing when using the campus? 2. How could an online platform make interacting within a physical space easier? 3. If you are in a physical environment, how could an online platform make it easier to interact with other students or colleagues who are over distance?
Summary, open questions by the participants, acknow-ledgement, and farewell	**10 min**

Appendix 2.2 – Interview guide: FGI with lecturers

Questions for the focus group interviews with lecturers

Duration of focus groups: 90 minutes

Welcome, presentation of the project, agenda for the focus group	**Welcome 15 min** – Welcome the participants – Collect the Consent Form – Start the audio transcription – Give information about the NIILS Project (informal inclusive learning environments) and the focus group – Participants are lecturers from different status groups (professor, lecturer, research associate) – Conditions are: Voluntariness, anonymity, confidentiality of all statements – Short self-presentation of participants (warm-up): name, faculty/study program, professional background, which campus working/teaching

c) **used informal or non-conventional learning spaces** on students' knowledge acquisition: **Satisfaction** with the support and the learning environment
 	
Campus Map on Mural or on moderation wall (if lecturers do not know any spaces, you might use pictures)
	Informal learning environments (15 min)
	
	– Which spaces for informal learning environments do you know? (Mark the spaces with dots on a Campus Map on MURAL or on a moderation wall)
	– How do the students use these spaces? Which spaces are used for focused learning activities? Which spaces are used for collaborative (community/group) learning activities?
	– What places do you use for meetings/interaction with students outside of courses and formal teaching situations?
	– Are you satisfied with the existing informal learning spaces for students?
	   • If yes, why? Which characteristics are satisfactory?
	   • If no, why not? What are the reasons?

d) Existing **inequalities and barriers** related to informal or non-conventional learning spaces, including access to technical equipment and internet as well as to physical-spatial environments conducive to learning and well-being
 	
PPT: List of categories for fewer opportunities
	In depth inequalities and barriers (15 min)
	
	➢ How do you evaluate the **access** to existing informal learning spaces on campus and in the surrounding?
	➢ Are you aware about any barriers that students face in accessing the informal learning spaces you mentioned?
	   o Examples: opening hours, registration /controlled access, physical barriers
	➢ How do you evaluate the **availability** of existing informal learning spaces?
	➢ Are there any obstacles regarding the availability of informal learning spaces?
	   o Examples: not enough places, too crowded, environmental factors (light, temperature, acoustic, air), atmosphere/well-being, technological infrastructure (plugs, Wi-Fi)
	– Now we want you to consider the **students with fewer opportunities** which can be identified as: ... (Read out/present categories out of the survey for students with "fewer opportunities")

	o Physical impairment (e.g. mobility, visual, auditive); Chronic somatic disease (e.g. multiple sclerosis, cancer, diabetes); Mental disease (e.g. Burnout); Learning disabilities (e.g. Dyslexia, Dyscalculia, ADHD); Cultural differences (e.g. different cultural background to my university); Language (I do not study in my mother tongue.); Economic obstacles (e.g. financial barriers); Need to work for living while studying; Family related obstacles (e.g. responsible for children or nursing cases); Geographic obstacles (e.g. remote residence); Age: − Are you aware if any of these groups of students face challenges in accessing and using the informal learning spaces? Have you observed any difficulties and barriers for these groups of students? If yes, what type of challenges?
e) Lecturers' **awareness and enabling strategies** to deal with existing inequalities and barriers	**Awareness and existing strategies to decrease inequalities (15 min)** − What do you think: Are these barriers known by your students and the university administration? − Are you aware or do you know if anything is being done to break down these barriers? − What could be done in the future to reduce these barriers? − Which strategies would decrease existing inequalities and barriers in accessing and using the informal learning spaces?
Hybrid and virtual learning activities PPT: List of in-depth-questions	**Definition Hybrid Activities:** combining activities with regard to space (physical _and_ virtual spaces) and time (synchronous _and_ asynchronous activities; see Reinmann, 2021, S. 4) _Examples:_ students meet partly physical and remote discussing a presentation (e.g. Zoom), students work together on a document (e.g. file sharing). Students get course material after class via the university provided learning platform (e.g. Moodle) **Hybrid and virtual learning activities (15 min)** Hand out the following questions as a questionnaire or prepare them in the MURAL Board, on the moderation wall or in a power point presentation. In-depth questions: 4. Can the integration of services in the virtual space (apps, etc.) help students to overcome barriers they are facing when using the campus? 5. How could an online platform make interacting within a physical space easier? 6. If students are in a physical environment, how could an online platform make it easier for them to interact with other students who are over distance?
Summary, open questions by the participants, acknowledgement and farewell	**15 min**

Appendix 2.3 – Coding list

The table below lists the deductive themes, as well as deductive and inductive categories and codes/subcodes:

Focus group	Themes	Categories		Codes/subcodes
	Deductive	**Deductive**	**Inductive**	**Inductive**
Students' FGI/Lecturers' FGI	Knowledge Informal Learning Spaces on Campus	Focused Informal Learning Spaces		
Students' FGI/Lecturers' FGI		Collaborative Informal Learning Spaces		
Students' FGI/Lecturers' FGI		Indoor Spaces		
Students' FGI/Lecturers' FGI		Outdoor Spaces		
Students' FGI/Lecturers' FGI	Inequalities and barriers	Availability barriers		Limited technological infrastructure
Students' FGI/Lecturers' FGI				Weatherproofness
Students' FGI/Lecturers' FGI				Lack of soundproofing / high noise levels
Students' FGI/Lecturers' FGI				Lack of gastronomic offers
Students' FGI				Inadequate temperature
Students' FGI				Lack of privacy/security
Students' FGI				Uncomfortable ergonomics
Students' FGI				Size of spaces / availability of furniture
Students' FGI				Lack of hygiene /cleanliness / inconvenient smell
Lecturers' FGI				Unsuitable lightning/ventilation

Lecturers' FGI				Lack of creative/collaborative/meeting spaces
Students' FGI/Lecturers' FGI		Accessibility barriers		Locked/controlled access
Students' FGI/Lecturers' FGI				Lack of information/transparency
Students' FGI/Lecturers' FGI				Poor overview of spaces
Students' FGI/Lecturers' FGI				Restrictive rules of use
Students' FGI/Lecturers' FGI				Occupation of spaces
Students' FGI/Lecturers' FGI				Restricted opening hours
Students' FGI/Lecturers' FGI				Physical barriers
Students' FGI		Barriers of SWFO		Financial barriers / need to work
Students' FGI				Language barriers
Students' FGI				Geographical barriers / distance
Students' FGI				Physical barriers
Students' FGI/Lecturers' FGI	Awareness and enabling strategies		Awareness but no actions	
Students' FGI/Lecturers' FGI			Awareness gap	
Students' FGI/Lecturers' FGI			Communication issues	
Students' FGI/Lecturers' FGI			Awareness hybrid/virtual spaces	
Students' FGI/Lecturers' FGI		Plans to break barriers		Creative spaces
Students' FGI/Lecturers' FGI				Enhancement of outdoor spaces / campus accessibility / functionality

Students' FGI				Booking system / time limits / reservations
Students' FGI				Access through student ID card
Students' FGI				Shielded spaces
Students' FGI				Regular meetings with stakeholders
Students' FGI				Addressing SWFO
Students' FGI				Web platforms for information
Lecturers' FGI				Stakeholder commitment/participation
Lecturers' FGI				Sustainability
Students' FGI/Lecturers' FGI	Hybrid and virtual learning activities		Wishes/demands	
Students' FGI				Guidance tools
Students' FGI				Digital ILS (live) maps
Students' FGI				Digital tools / apps
Students' FGI				Improved communication
			Specific challenges/needs	
Lecturers' FGI			Attendance vs. virtual presence	
Lecturers' FGI			Adapting to shifts pedagogically	Implementing digital tools
Lecturers' FGI			Virtual spaces as an extension of physical space	