

# Empowering a Universal Design Course for the Built Environment: Exploring Learning Experiences Through an Interdisciplinary, Multicultural and Civic Approach

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**Abstract.** Promoting inclusion and diversity is essential for creating an inclusive built environment. Next to building knowledge and understanding on the topic, it is also crucial to foster inclusive attitudes and awareness for both personal and professional growth. In developing a new architectural course ‘Designing with People’, our goal was to elevate knowledge and understanding of an inclusive built environment as well as to create more awareness on inclusion and diversity, guided by the Universal Design paradigm.

To achieve this, the authors established a civic approach and facilitated interdisciplinary, intercultural collaborations to create a symbiotic learning environment among international students Interior Architecture and Architecture, students Occupational Therapy, clients and user/experts. This paper explores the strategy for advancing universal design through collaboration and examines if and how a network of stakeholders can mutually benefit from shared learning experiences. To understand stakeholders’ perspectives, the study utilizes reflection reports, surveys with open-ended questions, and self-assessment questionnaires.

Results point to notable positive learning experiences in knowledge-sharing, way of working and thinking, a more nuanced view on people with disabilities and the synergistic combination of diverse perspectives, indicating that 1+1=3. While enhanced awareness among students on diversity and disability topics was less noticeable throughout the course, the intensive collaboration with international students from diverse geographical and cultural backgrounds seemed to increase awareness of other cultures and identities. The outcomes suggest that promoting mutual learning experiences among students from diverse disciplines together with other stakeholders, can not only enhance educational settings but also holds the potential to inform and improve universal design practices in various professional contexts. This opens up opportunities to significantly enrich the discourse on inclusion and universal design.

**Keywords.** universal design, inclusive design, architecture, occupational therapy, symbiotic learning, interdisciplinary collaboration, civic approach, higher education

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## **1. Pushing the boundaries of Universal design education**

Promoting inclusion and diversity is essential for creating an inclusive built environment. As a design paradigm, Universal Design (UD) can be considered a crucial element in this ambition, but what ingredients are essential for teaching UD to higher education design students? Drawing from the literature, several critical elements emerge: cultivating knowledge about a broad spectrum of users, integrating insights from diverse user perspectives throughout the design process, applying relevant research methods and tools to help students grasp user needs and fostering empathy between students and the diverse communities they serve [1-4].

However, can we push the boundaries even further to expand learning experiences and foster a more inclusive mindset and awareness for personal and professional growth? This aspect is important for everyone, regardless of their profession. Therefore, the authors aimed to look beyond the 'standard' ingredients of UD education in the development of a new design course, 'Designing with People'. A symbiotic learning environment was created involving a network of stakeholders, including students from occupational therapy (OT), architecture, and interior architecture, user/experts, clients, and the teaching staff. The concept of symbiotic learning, where all participants benefit mutually from shared learning experiences [5, 6] seems interesting to advancing UD through collaboration. In this way, there is not one direction in transferring knowledge – from tutors, clients and user/experts to students– but all involved stakeholders can learn from one another. In order to create a symbiotic learning environment, several strategies were explored to stimulate this.

Research demonstrates that an interdisciplinary collaboration between designers and Occupational Therapists has the potential of being an enriching collaboration benefitting both designers and Occupational Therapist [7]. Various studies have examined this collaboration in different design domains, such as product design [1, 8], visual communication design [9], industrial design and architecture [7, 10-12]. The main driver for such a partnership between OT and design students is the need for collaborative efforts within the design process to become richer and better serve the needs of diverse users [10]. This aligns with and can enrich the goal of teaching UD as discussed above.

To further strengthen this symbiotic learning environment, user/experts and clients are involved. Applying a UD process implies that diverse users are central in the design process. User/experts, a term coined by Ostroff [13], support this bottom-up approach [14] to learn from “developed natural experience in dealing with the challenges of our built environment” [13]. In addition, both clients and user/experts not only provide students with real-world insights but they can also ensure that the designs are more responsive to the needs of those who will use them [13]. This civic aspect may deepen students' learning experience, fostering a more comprehensive understanding of UD and its impact on diverse users. However, is it also possible for clients and user/experts to learn from each other or from the students in symbiosis? Little is known about their learning experiences. Some studies discuss user/experts' perceptions and experiences in architectural co-design processes [e.g., 15], but they do not address their mutual learning experiences. With this in mind, this study explored the two-way learning experiences of all involved stakeholders within a symbiotic learning environment.

## 2. Method

The course “Designing with People” (3 ECTS credits) took place from January to June 2024 (involving 11 weekly 3-hour sessions with supervisors). In order to examine participants’ learning experiences, a combination of different research methods was used tailored for each group of stakeholders.

For this study, 19 master students Occupational Therapy and 18 international (bachelor and master) exchange students interior architecture (n=4) and architecture (n=14) participated, coming from Brazil, Ecuador, France, Hong Kong, Italy, South Africa, Spain, Poland, and Portugal. Each student was asked to fill in a questionnaire at the start and the end of the course. We adapted the Self-Assessment Inclusion Scale (SAIS) to measure students’ awareness towards disability and inclusion [16]. In addition, students wrote a reflection report at the end of the course, including responding to probing questions on what they have learned from different stakeholders during the process.

Both the user/experts with physical (n=3) and visual (n=5) disabilities and the clients (n=2) involved in this year’s design assignments completed separate surveys with open-ended questions after their final course intervention. Finally, the teaching team (n=4) from both faculties were asked to reflect on their learning experiences with regard to all involved stakeholders. The data from the reports and surveys were analyzed using thematic analysis to identify common themes and insights.

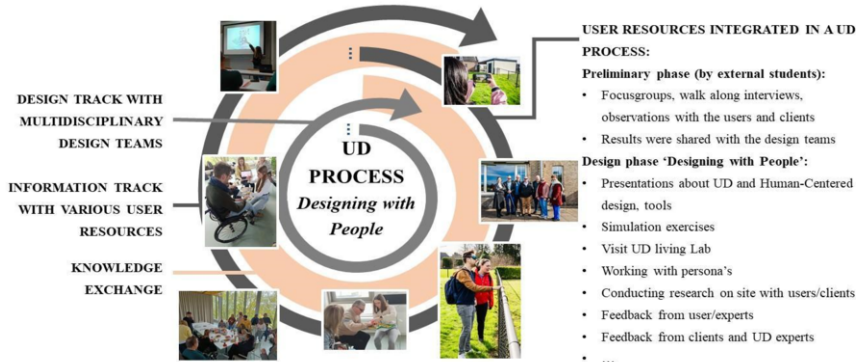
## 3. Set-up of a Universal Design course aiming to foster symbiotic learning

Given the fairly limited time available for students in a 3 ECTS course, prior to the start of the course ‘Designing with People’, external students already gathered extensive data on two design assignments of real cases through interviews, observations, and focus groups during a preliminary phase. Insights from this initial stage were shared with the ‘Designing with People’-students in the third session of the course. This year, both cases focused on designing ‘a garden for all’: one near a cohousing project for people with vision impairments that was publicly accessible, and one private garden for patients in a psychiatric care home. Students were encouraged to follow accessibility norms, but specific accessibility regulations were not integrated.

The course began with an introduction to Universal Design (UD), Human-centered Design, and relevant research methods and tools (e.g., personas). Additionally, various user (re)sources were integrated throughout the course, utilizing both direct and indirect user information. Resources included context-independent and context-dependent knowledge on UD [17, 18]. *Figure 1* shows the actions and activities initiated by the tutors to enhance knowledge and awareness about UD. In addition to these resources, the student teams gathered information themselves throughout the design process.

In this specific context, two strategies were implemented to foster a symbiotic learning environment. First, an interdisciplinary collaboration was set up between two faculties: at least two students from the international exchange design programs worked together in design teams with at least two master’s students in OT. In addition to this interdisciplinary approach, it is important to note that the design students came from various countries and cultural backgrounds (see section 2). Both aspects contributed to the diversity of the design teams bringing different perspectives on design and user experience, without making this explicit to the students.

Second, a civic perspective was incorporated by involving actual clients and user/experts with disabilities in real-life cases within the built environment. The objective was to establish an ongoing network where the same group of user/experts and clients would engage on a structural level annually, thereby fostering collective knowledge on UD [19]. This had three primary goals: (1) to enhance familiarity among stakeholders, (2) to create an efficient and effective structure, and (3) to facilitate mutual learning and inspiration over the years.



**Figure 1.** Overview of the UD course 'Designing with People' and examples of integrated user resources.

#### 4. Analyzing stakeholders' learning experiences

When analyzing the gathered data, we identified various learning experiences for the different stakeholders. First, we focus on the interdisciplinary student collaboration and their diverse learning experiences. Second, we examine the results from students' self-assessment evaluations. Finally, we elaborate on the learning experiences from a civic perspective, involving all involved stakeholders.

##### 4.1. Students' learning experiences from an interdisciplinary approach

When comparing what design and OT students learned from each other, some parallels are noticeable. Although it was not clear to everyone at the start of the course how their design process would benefit from interdisciplinary collaboration, both groups highlighted the value of this approach by the end of the course. They recognized that collaboration brought diverse perspectives that enriched the project outcomes in several ways. Three themes were identified in the analysis:

##### 4.1.1. Learning from each other's way of working and thinking

The working and thinking styles of both groups clearly differed, leading to distinct knowledge outcomes. OT students learned from the technical design skills, visualization capabilities, and creative problem-solving approaches of the design students. They valued their creative approach to creating comprehensive visual representations: *"The creativity with a design, although I came with ideas and a simple visualization. They could actually put it into a design and visualize it with little adjustments to make it prettier, etc. Very intriguing"* (OT student).

Design students' learning experiences focused more on enriching the design by listening to other perspectives: *"The mix of ideas [...] makes me understand that I have to keep in mind to listen to various points of view. It feels logical but it's not always easy to have different opinions on design and actions"* (design student). Additionally, some design students gained insights into organizing work differently and learned about tools and devices that can support the design process: *"Their way of organizing work is very different, even though not all of their habits are suitable for me, [...] I took some notes for myself and probably I'm going to use some of the tools they use"* (design student).

Some challenges were mentioned as well. Although both groups clearly valued the interdisciplinary and multicultural approach, it challenged them to understand each other's roles and mutual understanding at the start of the process. One OT student suggested to the tutors to establish an *"early and ongoing dialogue to bridge disciplinary gaps, fostering mutual understanding of each other's roles and contributions, and implementing collaborative workshops or joint training sessions to enhance interdisciplinary teamwork skills"*. It was initially unclear for some design students what the contributions of OT students to an architectural design process could be: it *"took a while to understand that the role of the occupational therapists were different"*. OT students were more challenged by practical aspects, such as (mis)communication issues.

#### 4.1.2. Awareness towards inclusion and diversity

Design students particularly appreciated the OT students' focus on mental health, daily life impacts, and user-centered thinking: *"I learned how much mental health could impact daily life and small actions, in how we move, speak, and act"* (design student). This interdisciplinary collaboration further helped them focus on the needs of various people throughout the design process, influencing *"every decision, every curve of the path, and every choice of plant was scrutinized through the lens of therapeutic benefit"* (design student). Interestingly, OT students did not elaborate on learning explicitly about inclusion from their colleagues, but they were inspired by the diverse cultural backgrounds of the design students. For example, one student noted: *"The collaboration with the (interior) architecture students with diverse cultural backgrounds was very interesting and allowed me to look at a range of perspectives"* (OT student). Findings indicate that the students' prior experiences and cultural contexts contributed to richer discussions and alternative approaches to problem-solving in Universal Design.

#### 4.1.3. 1+1=3

Both groups valued combining different visions to enhance the overall design in ways they could not achieve without this interdisciplinary approach: *"I really was surprised how we could improve our creativity together and get to even better solutions together"* (OT student). OT students were appreciated for improving the design by truly understanding the needs of different users, while design students could *"put values or numbers on it"* and excelled in balancing usability and inclusion with aesthetics and attractiveness. OT students learned to consider more elements in their projects, such as material choices and spatial aesthetics, broadening their understanding beyond functionality. They highly valued seeing their concepts visualized and enhanced by the design students, reinforcing the importance of aesthetics in functional design: *"I won't soon forget the power of drawing out ideas. Previously, ideas remained purely in my head. By making them visual, it immediately becomes clear what strengths and weaknesses the idea has. It is easier to ask for feedback from others and make*

*adjustments*" (OT student). Thus, the strengths and knowledge of both groups enabled a synergistic combination that enhanced the design outcomes.

#### 4.2. *Assessing students' awareness throughout the course*

Students filled out a self-assessment questionnaire (SAIS) at the start and end of the course. Although the sample was limited and there was no control group, it is interesting to elaborate on how students (subjectively) assessed their awareness towards disability and inclusion. A statement that scored high, but without much change between the first and second assessment, was 'accepting people with a disability [...] equally in their work': seven out of 10 students indicated to 'always' do this.

For approximately half of the questions, we observed little difference in the number of students who applied this 'always,' but we did see a reduction in the number of students who indicated they 'never' or 'rarely' apply it. Although there was generally little noticeable change between the first and second assessments across different topics, a distinct positive evolution was observed in statements concerning various cultural backgrounds and identities, both one's own as well as other people's background:

- I learn about specialized cross-cultural topics that are necessary for my work ('always' evolved from 16% to 28%)
- I am aware of how my own cultural identity influences my judgment of what is considered normal, mainstream, appropriate or acceptable ('always' evolved from 28% to 41%)
- I am aware of assumptions I make about people with a different cultural background ('always' together evolved from 12% to 24%)

As the design teams comprised at least two international students, this dynamic may indicate to subtly enhance awareness of cultural diversity. Collaborating with peers from different geographic and cultural backgrounds likely fostered a deeper understanding of cultural nuances. This exchange not only enriched the design process but also promoted a more inclusive approach to addressing cultural identity and diversity.

#### 4.3. *Learning experiences from a civic approach*

In this section, we delve into the learning experiences of all stakeholders involved, including students, clients, user/experts, and tutors.

##### 4.3.1. *A more nuanced view on people with disabilities*

Students emphasized the importance of involving user/experts in the design process. Both groups found interactions with these experts enlightening, deepening their understanding of user needs and influencing their design approach. "*I learned that architecture is not just about creating spaces; it's about understanding the people who inhabit them*" (design student). Insights gained included diverse challenges faced by individuals with disabilities, unique needs of each person, and sometimes conflicting requirements among different users. OT students highlighted the importance of avoiding stigmatizing solutions: "*They want to be treated like everyone else and not be seen as different from others.*"

This seemed eye-opening to several design and OT students, comprehending the complexity of satisfying everyone and emphasizing the importance of thoughtful design decisions to balance competing needs. This heightened awareness prompted students to

delve deeper into the 'why' behind design decisions and to strive to avoid making assumptions.

User/experts also appreciated learning from their peers, acknowledging shared challenges despite individual limitations. During the co-creation day, these user/experts were paired with others having different disabilities, enhancing their understanding of varied needs. Both tutors and user/experts highlighted how direct contact with diverse user/experts significantly enriched their understanding. "*You learn to look beyond your own limitations,*" remarked one user/expert.

#### 4.3.2. *Resonating beyond academia*

The application of a real case with actual clients and users was generally seen as enriching the design process: "*The fact that the assignment was linked to a concrete case made it even more interesting*" (OT student). This approach significantly broadened students' ideas, underscoring the significance of UD principles. It helped them grasp the profound impact their designs could have on someone's daily life. Clients indicated how students' ideas -sometimes showing fresh or out-of-the-box thinking- opened their mindsets towards new possibilities for their case. Clients also referred to ideas from the other case that could be interesting for them as well. Both clients and user/experts commended the students' enthusiasm and collaborative engagement. Some user/experts highlighted their satisfaction in contributing their expertise to make a positive impact. This was very important for several user/experts.

On a more practical and organizational level, the tutors also valued how collaborating with user/experts kept them vigilant in making the course itself, along with its materials and communication, as inclusive as possible for everyone. Clients stressed the importance of maintaining ongoing contact to understand how different design proposals influence and endure in real-world applications. Establishing a structured learning network was therefore appreciated to benefit this objective.

## 5. Discussion and conclusion

This study explores a strategy for advancing UD by creating a symbiotic learning environment that fosters mutual learning among all stakeholders. Results indicate that students' learning experiences extended beyond explicit knowledge sharing, encompassing tacit learning that positively influenced their understanding of UD and inclusion [20]. User/experts and clients mainly mentioned explicit learning experiences, possibly due to the lower intensity of collaboration between these stakeholders compared to that between the two student groups.

Although both groups valued interdisciplinary collaboration, it initially challenged them to understand each other's roles, which has also been experienced in other studies [7, 10]. Enhanced awareness among students on diversity and disability topics was less noticeable from their self-assessment evaluations at the start and end of the course; however, an increase in awareness for other cultures and identities was noticed. Intensive collaboration with peers from diverse cultural backgrounds seemed to influence students' awareness and contributed to richer discussions on the topic of UD. These findings support the importance of creating sustained interactions among diverse stakeholders to enhance understanding and implementation of UD principles [11], but more research is necessary to confirm this. The civic approach, involving clients with real cases and

user/experts, was highly appreciated by all stakeholders. This collaboration provided a nuanced view of people with disabilities, highlighting the value of learning directly from those with lived experiences [21]. It facilitated a deeper understanding, awareness of diverse needs and the impact of designs on users' experiences, among students as well as user/experts, clients, and the teaching team.

Given the limited sample size, caution is needed when drawing conclusions. A larger sample size and longitudinal study would both provide more robust data to validate this approach. The latter could also provide insights into shifts in stakeholders' attitudes over time. Additionally, a continuous focus on diversity and inclusion awareness and UD methods from earlier educational stages, including bachelor's, may support enhancing students' awareness for both personal and professional growth. Future research could therefore investigate how to integrate these topics into curricula (including hidden curricula) earlier and more structurally. While challenges remain, the findings underscore the importance of creating symbiotic learning environments that facilitate mutual learning and understanding among diverse stakeholders.

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