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Transforming our World through Universal Design for Human Development
I. Garofolo et al. (Eds.)

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Accessible University: Architectural Design for Special Needs Users Integration. Design Proposals for Politecnico di Torino

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Abstract. In Italian and international universities, more and more attention is paid to special needs users who are part of the student and academic community. The so-called special needs are students and employers with specific needs deriving from physical disabilities or cognitive difficulties of different nature and severity, for whom it is necessary to provide specific services for the ordinary carrying out of their activities forward their full inclusion in the university community. The problem of special needs full inclusion must be addressed by overcoming the idea that they constitute a separate group from the rest of the community. Indeed, there should not be a project for special needs, but all spaces should be inclusive and designed "for all". The paper describes the TAL, Turin Accessibility Lab research group, activities concern the accessibility of study spaces, within the perspectives of Politecnico di Torino Masterplan and with the involvement of the users themselves and in collaboration with the institutional actors who deal with users with special needs.

Keywords. Universal design, special needs students, university spaces, social inclusion

1. Introduction

During the pandemic, many students started their university careers without attending real spaces. Connected through online platforms from their homes, the students not only attended the courses but also worked collaboratively with their colleagues in group work and developed sociality with the academic community as much as possible. The organization of the virtual classrooms made it possible to continue with the activities in the emergency period and bequeathed an additional tool, now acquired by all, to make university activities more flexible, with some undisputed advantages. However, the return to in presence experiences, in classroom and university spaces is fundamental to make the university training experience complete. Indeed, it is not limited to learning but includes socialization, exchange, participation, and complimentary cultural activities that cannot be reproduced in the virtual dimension. The return to the classroom and to the physical space of the university is now more complex by blended teaching methods, which provide for extended accessibility to in presence users and to those forced into virtual presence. That leads to rethinking the quality of spaces and services and new needs of all members of the academic community are highlighted.

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The TAL - Turin Accessibility Lab - is a multidisciplinary research center of the Department of Architecture and Design of the Politecnico di Torino that deals with accessibility and social inclusion through research and teaching activities, working in networks with other accessibility labs set up by Italian universities. In the last few years TAL has begun a close collaboration with the university Special Needs unit which is the reference point for all users who experience difficult situations due to temporary or permanent disability problems, supporting them to overcome physical, perceptive, communicative, and cultural barriers. Among the services managed directly by the Special Needs unit, there is a one-to-one interview service, classroom for assisted study, and a rest area of the users with certified disabilities, in addition to the management of a community platform. The unit works together with other institutional figures such as the Diversity and Disability Manager, the Vice-Rector for Quality, Welfare, and Equal Opportunities, The Rector's Advisor for Social Assistance, Social Integration and the Rights of Persons with Disabilities and the CUG (Equality, Non-Discrimination and Anti-Harassment Committee. This team of institutional figures and operational units, dealing with complex and transversal issues, is constantly confronted with other parts of the organizational structure of the University, with skills and tasks in numerous areas such as logistics, culture, communication, construction, teaching. In this complex framework, the TAL offers an operative contribution to projects and new initiatives, proposing solutions to improve the physical and perceptive accessibility of spaces, considering the universal design principles [1].

2. The university development scenario

The development and progressive implementation of the University Masterplan projects is an area of close collaboration between TAL and the Special Needs unit.

The new projects under construction and planned expansion and reorganization of the University are integrated into the Masterplan, which is characterized by being a polycentric structure, not organized in a single campus, but characterized by a series of network structures in the city of Turin. The Politecnico community is made up of about 38,000 people, including 36,250 students, almost a thousand professors and just under 900 administrative and technical staff. It is a growing structure, with a forecast of 20% of students by 2024 and a growing increase in foreign students. Internationalization, openness to the territory, and intensification of collaborations with public and private institutions in the fields of engineering, design, and architecture are the programmatic lines of the University's strategic plan. These lines are reflected in the expansion model, which provides, in addition to the two campuses (Campus Engineering, in the headquarters of Corso Duca degli Abruzzi and Campus Architecture and Design, in the historic site of the Valentino castle), eight thematic hubs, in which teaching, research, and collaboration are integrated with external parties (fig 1). The polycentric structure has as its strong point the rooting with the city context and the triggering of numerous opportunities for urban regeneration and recovery of disused structures but poses the first complex problem: accessibility to the various university services corresponds in part to the urban accessibility, of the most complex accessibility challenges [2].

The development process of the Masterplan is supported by a work unit (Masterplan office) which has the task of giving a spatial configuration to the transformations to facilitate decision-making processes between the various stakeholders involved inside

and outside the University. These are not architectural projects, which are developed from time to time by specific professionals in charge, but qualitative and quantitative prefiguration that illustrate the results of the strategic choices of localization and redistribution of functions and services. In this context, the TAL has started a support activity that assists the Masterplan office to articulate the question, the preliminary studies and the prefiguration and subsequently, when the projects reach the definitive phase, the verification of the correct responds the accessibility requirements.

TAL collaborates with all these subjects by participating in thematic focuses on the various development initiatives of the Masterplan and at the same time involving the students of the university involved in the Inclusive design in engineering and architecture sciences course, the main users of the transformations in progress, in design experiments on the improvement of university services, accessibility and social inclusion. The activity proposed in the course allows you to deepen the users' point of view and better understand their needs and interpret them in the best possible way in the proposed projects, as in the reorganization of services for special needs and study spaces described below.

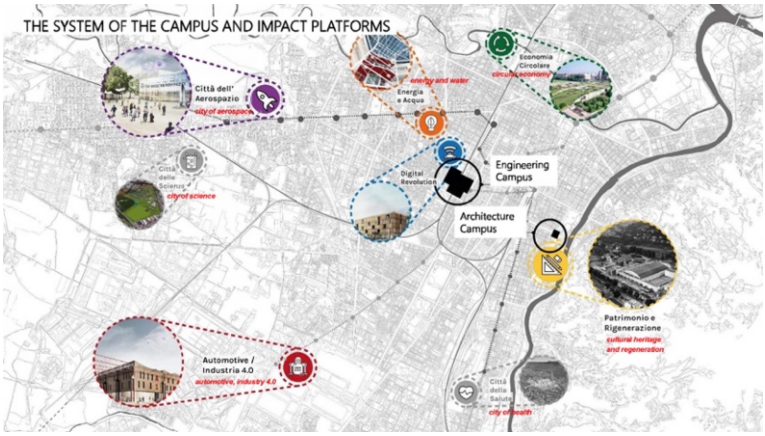


Figure 1. Development scenario of the Polytechnic of Turin according to a polycentric model that includes two campuses and decentralized thematic hubs (source: https://www.masterplan.polito.it/).

3. Inclusive design in engineering and architecture sciences

The course is among the free-credits of the University catalog, open to all 1st level Degree Courses of the Engineering and Architecture Area of the Polytechnic of Turin.

It aims to address and deepen, with a multidisciplinary approach, the issues of inclusion, usability and safety in the built environment, considered in a broad sense, with particular attention to the opportunities offered by IT.

The course includes teaching contributions on the following topics:

• overcoming of perceptual and physical barriers to improve the use of spaces;

• accessibility of communication and use of IT tools, aids and devices to improve accessibility;

• signage elements, visual displays, orientation.

During the course, students are involved in a multidisciplinary accessibility project on a complex theme in which they put into practice the contents learned in the theoretical

lessons through innovative solutions in different areas: the city, architecture, object of use, home automation systems, wayfinding, communication, web services, the internet of things, services and processes to support people in difficult and marginalized conditions. The design methodology is accessible even if students came from different disciplines (fig 2) [3]:

• identification of the problem and decomposition into components;

• collection, organization and analysis of data and information also through the use of questionnaires proposed to their classmates

• creative project or concept proposal

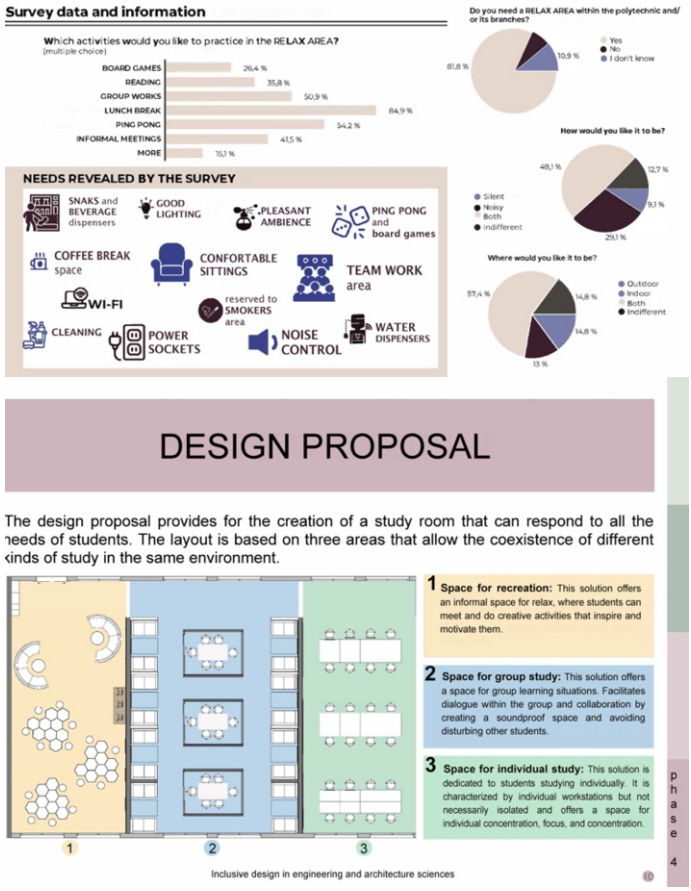


Figure 2. Examples of some elaborations of the students of the courses in Inclusive design. Above: data collection and analysis through questionnaires addressed to the student community. Below: concept for study rooms where it is possible to carry out individual or creative group activities.

The student thus learns to develop an analysis of the needs of different profiles of users and to correctly associate the project requirements and the possible performance responses referable to the territorial scale, external spaces, buildings, objects, communication tools, and technological and social systems.

During the last academic years, students were assigned the topic of accessibility by taking as a case study the offices of the Politecnico di Torino and the latest developments envisaged by the Masterplan.

The topics chosen and analyzed by the students concerned the spaces dedicated to study (multifunctional study rooms inside and outside the buildings), relaxation, leisure, physical activity, and religious functions, signage and wayfinding, reception, listening, and support services for students and University staff. The working groups are made up of students from different courses in engineering, architecture, and design

Each group chose a specific topic, proposing an innovative solution for improvement, adaptation, and expansion of functions and services.

For the study spaces, the students defined project needs and requirements according to the main study methods identified: individual and group [4]. In the first case, it is necessary to preserve silence, concentration, and privacy. In the second case, instead, dialogue and comparison between companions is necessary with an optimal choice and configuration of the furnishings [5].

They also pointed out the importance of having toilets and spaces, dedicated and acoustically isolated for relaxation, recreation, and refreshment, near the study rooms. They highlighted the need to more easily identify the location of the study rooms, the availability of seats, access control, and the possibility of extending opening hours.

4. Design proposals for Special Needs unit and study spaces

The design brief was defined starting from the analysis of the support initiatives that the Special Needs unit offers to students with disabilities or specific learning disabilities (SLD) during their training.

Having defined the activities and services that require a space of use, a detailed questionnaire made it possible to identify for each one the indicative number of people who use it, the frequency of use and all the requests related to the use of the spaces. In this way it was possible to outline a framework of needs and requirements to define the size of the spaces, the plant equipment, the furnishings and equipment and to identify the possible relationships between the spaces considering the activities that must be separated or kept close together or that it is also possible to superimpose in the same space at the same time or at different times (shared spaces).

The synthesis of the requests led to the identification of some spaces designed to respond to the specific needs of students with disabilities or SLD, such as rest and "one to one" interviews, while the study spaces were seen with a view to inclusion, thinking to flexible environments that facilitate the meeting between students and allow different forms of study: group, individual, assisted.

The following spaces were therefore defined:

- relax area: room equipped with 2 orthopedic beds, for the rest of the students with motor problems or specific needs
- one-to-one interview space: space dedicated to initial interviews and ongoing tutoring for students with disabilities and/or with specific learning disorders (SpLD) taken care of by the Special Needs unit
- counselling service: space intended for listening and psychological support for the entire student community

- waiting room: room in front of the listening space with a waiting and filter function, preferably with independent access to ensure privacy
- assistant's room: room intended to accommodate two health workers, when not involved in supporting people with disabilities present in the university
- special needs office: rooms for the staff of the service
- study room: study room, open to the entire student community, flexibly furnished, suitable for both individual study and group study
- individual study: space with individual workstations also equipped with dedicated software, hardware, and specific supports
- assisted study: space dedicated to students with SpLD who are accompanied in their studies by a tutor
- exams room: space intended for carrying out exams for students who require special conditions due to health problems or disabilities.

The second phase involved the definition of the guiding principles of the project, including fundamental (fig 3):

- short and long-term reversibility, and therefore the possibility of reconfiguring the distribution layout by adapting the arrangement of furnishings, workstations, partitions to different usage scenarios
- flexibility, meant to the availability of different types of work and study space: teamwork, individual study, informal activities, assisted study
- quality and comfort, that is, having comfortable spaces where the right balance between privacy and sociability is also guaranteed
- physical, perceptive and cultural accessibility: therefore, inclusive spaces, open and usable by all, recognizable and in which to orient oneself easily
- "values" communication.

In accordance with the indications of the masterplan, different design scenarios have been developed, taking into account some possible localizations of the University.

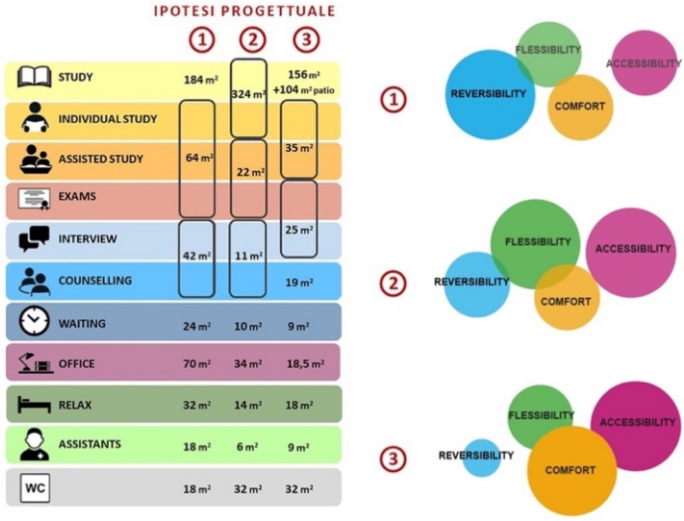


Figure 3. Comparison between the three design hypotheses and evaluation according to the established project requirements: flexibility, reversibility, comfort, accessibility.

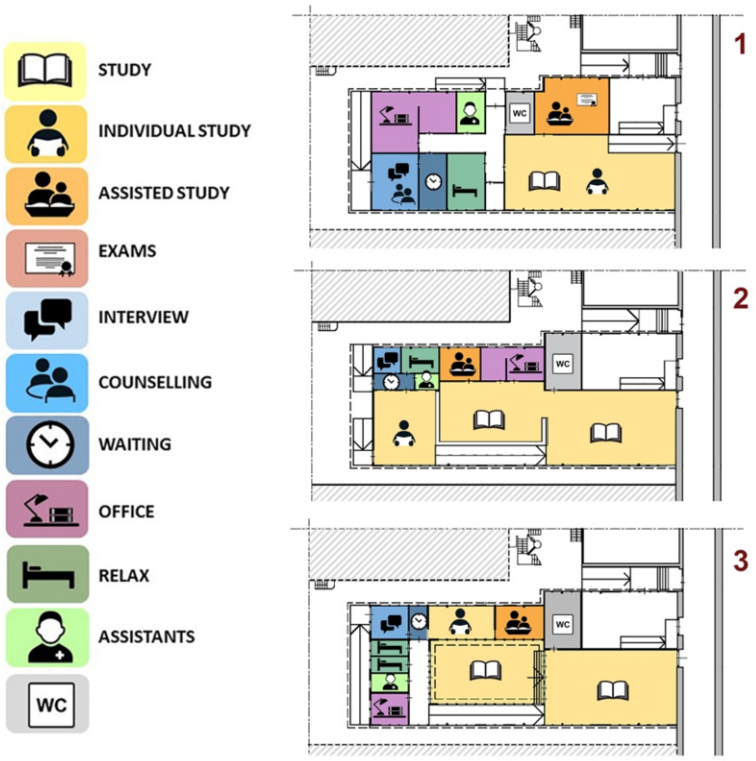


Figure 4. comparison between the 3 distribution layouts developed in the refurbishment of the existing building to be adapted to a new pole for the Special Needs unit

One of the thoughtful areas is an external prefabricated building connected with the central corridor currently used as classrooms. It needs major redevelopment works because it is no longer suitable from a building and energy saving point of view. Three design hypotheses have been defined that respond to the project brief respecting the constraints of volumes and the structural grid (fig 4).

The three projects that follow an ever-increasing scale of commitment of resources, economic and working students, and offer different distribution and comfort solutions to be presented and discussed with stakeholders (decision makers, masterplan developers, and in the university community).

Particular attention is paid to study spaces, in which, in addition to the needs of students with special needs, the emerging needs of the entire university student community have been taken into consideration, including concerning recent innovations in the provision of teaching during the COVID-19 emergency period. In this regard, design hypothesis 3 proposes the creation of a patio that becomes an outdoor study area and an outdoor space where to transfer some socialization and collaborative activities [6-7] (fig 5). The different hypotheses were compared by considering the areas intended for individual activities in terms of dimensions, the coexistence of several activities in the same spaces in the often period of time or at different times (shared spaces) and the response to the principles of reversibility, flexibility, accessibility, quality and comfort, placed at the base of the project.

5. Conclusion

University campuses are often not suited to special needs users and interventions to improve their accessibility to services are generally limited to the regulation compliance, creating dedicated, but poorly integrated, spaces that generate barriers inside the university community. The problem of special needs full inclusion must be addressed by overcoming the idea that they constitute a separate group from the rest of the community. Indeed, there should not be a project for special needs, but all spaces should be inclusive and designed "for all" [8]. The special needs users' full inclusion can be achieved by applying the principles of design for all. For real accessible and usable university spaces, in addition to a strong top-down commitment by the university administrations, the overcoming of many procedural and procurement barriers that hinder the creation of works with a vision beyond simple "compliance to normative" is mandatory.

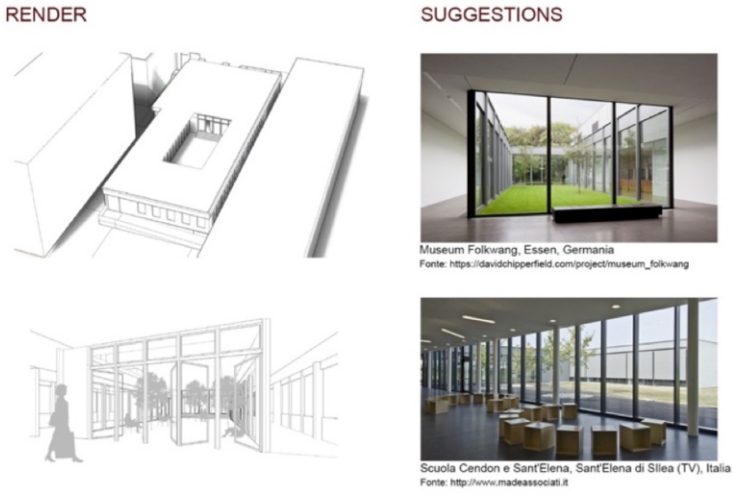


Figure 5. Hypothesis three with the patio that improves the indoor environment from the point of view of perception and natural lighting and that can be equipped for outdoor study activities.

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