THE NEW CURRICULUM OF THE DESIGN COURSE OF THE SCHOOL OF ARCHITECTURE AND URBANISM AT THE UNIVERSITY OF SÃO PAULO, BRAZIL. FLEXIBILITY IN HIGHER EDUCATION AND INTEGRATION OF KNOWLEDGE

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Abstract
The Design course of the University of São Paulo was created in 2006, involving professors of three Departments of the School of Architecture and Urbanism (FAU-USP) and of the Polytechnic School (EP USP), School of Business and Economics (FEA USP) and School of Communication and Arts (ECA USP). The design activities were the core of the curriculum. They took up more than half of the timetable of the course, mainly the disciplines offered by the Project Department of FAU, covering the fields of product and graphic design, occasionally taught together or in collaboration with professors of other Schools or Departments. Nearly all the curriculum was made up of compulsory disciplines. The graduation of the first group of students in 2010 provided the opportunity to rethink the course. The coordination of the course – CoC - organized a work team with professors, students and former graduates and performed a diagnosis. Based on the results, the team started working on the proposal of a new pedagogic project in a collective and collaborative manner. The new project has kept to the aim of a five-year-generalist education, which is design-centered. The curricular grid has changed due to a reduction of the number of compulsory disciplines and an increase of the number of the electives, giving the students a wider range of options to choose from. The main innovation was the creation of elective design disciplines called (EDM) Elective Design Modules and (IDM) Integrated Design Modules. Those disciplines run on a bimonthly basis on fixed days of the week in the hope of decreasing the number of simultaneous projects developed by the students, facilitating the integration among students of different levels and providing them with more autonomy so as to make undergraduates partly responsible for their education path. The EDM disciplines involve the development of projects of visual, product and/ or service design taught by professors of the Project Department. The IDM disciplines deal with interdisciplinary projects with the joint responsibility of professors of the Project Department and from other Departments or Schools. The new Pedagogic Project was approved in 2017 and started to be gradually implemented in 2018. The transition between the two curricula should be completed in 2022.

Keywords: curriculum design; design course; interdisciplinarity.

1 INTRODUCTION

The School of Architecture and Urbanism of the University of São Paulo, Brazil, has had a long tradition in the teaching of disciplines of Industrial Design and Communication/ Graphic Design since 1962 when an architecture curriculum was implemented in order to graduate a professional who could deal with projective tasks in different scales, from the city (urban planning, landscape design), passing through the building (architecture itself) to the object (industrial design and communication).

The bachelor’s degree in design was introduced in the school in 2006, following a demand from São Paulo State productive sector. The Design Course was created keeping the tradition of teaching design in a way that could be linked to the field of architecture, but at the same time relying on knowledge from other schools: Engineering (Polytechnic School, EP USP), Marketing and Economics (School of Economics, Business and Accounting, FEA USP) and Communication (School of Communication and Arts, ECA USP).

The course runs in the evening and lasts five years. Some new professors have been hired and others who teach in the Architecture and Urbanism course have committed themselves to working in the design course. In spite of having a generalist approach, the course has two main branches: communication/ graphic design and industrial design. The projective tasks are the core of the curriculum covering more than half of its timetable, mainly by the disciplines offered by the Project Department of FAU. Those disciplines involve the fields of product and graphic design, occasionally taught together or in
collaboration with professors of other Schools or Departments. Nearly all the curriculum was made up of compulsory disciplines. The graduation of the first group of students in 2010 provided the opportunity to rethink the course. The course coordinating committee — CoC-Design — organized a work team with professors, students and former graduates who performed a diagnosis, the results of which showed some problems: 1) there were too many compulsory disciplines; the few electives could only be chosen in the last year while the students were doing their end-of-course work; 2) for eight semesters students had to take both disciplines of industrial design and graphic design simultaneously, which calls for too much effort and shifts the focus; 3) the students often had preferences in terms of those two fields of design but they were made to take both; 4) the structure of the grid was created guided by the enhancement of the complexity based on the increase of the space scale, which is a heritage of the teaching of architecture and urbanism course and therefore does not make sense for the design field. 5) the design curriculum had two compulsory disciplines of architecture projects and urban planning but a designer is not permitted to design buildings, districts or cities because that is the allocation of responsibilities of an architect.

Based on the diagnosis results, the team started working on the proposal of a new pedagogic project in a collective and collaborative manner. The new project has kept to the aim of a five-year-generalist education, which is design-centred.

2 METHODOLOGY

The development of the new curriculum proposal involved: analysis of the original pedagogical project to carry out the course diagnosis, bibliographic research on studies related to theory and design education as well as aspects related to legislation for design education in Brazil. Debates were promoted among professors and current and former students for the co-creation of the pedagogical project. The following topics were considered: objectives, desired profile of the graduated students, curricular structure (grid and its detailing), discipline syllabus (compulsory and elective) other curricular components (end-of-term work, internship), other relevant information that deals with the relationship between teaching, research and university extension activities.

The process lasted 5 years, from 2013 to 2017, with work groups that involved teachers from different departments and schools, as well as design students. The activities developed were shared online with all of them so as to make proposals that articulated precepts and pedagogical requirements with strictly operational issues. Many plans, simulations and revisions were necessary in order to guarantee the creation of a coherent and relevant document. After the diagnostic step, necessary requirements were established for the change of the curriculum, which should take into account the aspects described below:

a) first propaedeutic year where students would be presented to main design tools;
b) inclusion of Introductory Project disciplines from the second year;
c) greater flexibility in the choice of design studio disciplines from the third year on, balancing the need for choice and assurance of generalist training;
d) increase of the academic load of technical disciplines related to the design field, (product, service and graphic design);
e) exclusion of mandatory disciplines that dealt with themes closely linked to the architecture and urbanism course
f) inclusion of the possibility of students getting credits not only with elective disciplines created for the course, but also with freely elective disciplines (any discipline offered by USP)
g) design as the core of the course, including opportunities for integration with other areas of knowledge.

3 THEORETIC FRAMEWORK

Authors such as Gui Bonsiepe [1] and Nigel Cross [2] who address design theory have been considered to characterize the specificity of the design field: the central role of activities that lead to the “conception and realisation of new things” [2], a focus on the human, the need to deal with complex and ill-defined problems, processes of convergent and divergent thinking, creativity and innovation.
According to Cross [2], both the acts of creating and planning are inherent in man, as well as the ability to solve everyday problems and deal with complex contexts. This means that, to some extent, everyone has the ability to design. What differentiates them from the professional who possesses the specialized training is the way of thinking and behaving, the means of operation and the results generated. For the author, it is interesting to compare Design with two other major areas of knowledge (science and humanities, Table 1) for a better understanding of its nature, since it is difficult to define.

Table 1. Comparison among different areas of knowledge.

<table>
<thead>
<tr>
<th>Study of phenomena</th>
<th>Science</th>
<th>Humanities</th>
<th>Design</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Natural world</td>
<td>Human experience</td>
<td>Artificial world</td>
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<tr>
<td>Methods</td>
<td>Controlled experiments</td>
<td>Analogy</td>
<td>Modelling</td>
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<td></td>
<td>Classification</td>
<td>Metaphor</td>
<td>Pattern formation</td>
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<td>Analysis</td>
<td>Evaluation</td>
<td>Synthesis</td>
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<td>Values</td>
<td>Objectivity</td>
<td>Subjectivity</td>
<td>Practicality</td>
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<td></td>
<td>Racionality</td>
<td>Imagination</td>
<td>Ingenuity</td>
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<td></td>
<td>Neutrality</td>
<td>Commitment</td>
<td>Empathy</td>
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<td></td>
<td>Sense of truth</td>
<td>Sense de justice</td>
<td>Sense of adequacy</td>
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A similar comparison is also made by Bonsiepe: “The designer watches the world from the point of view of the project. The scientist, on the other hand, does it from cognizance (…), the scientist is the researcher that creates new knowledge. The designer enables new experiences in everyday life in a society, experiences in the use of products, signs and services, including experiences of an aesthetic nature, which, in their turn, depend on sociocultural dynamics.” [1, p.230]

Design education involves, in a certain way, the learning and use of these methods (modeling, pattern formation and synthesis) the development of this sense of adequacy, trying to modify everyday practices “(…), enabled and mediated by material, immaterial and semiotics artifacts.” [1, p.197]

Mike Tovey was an important reference on design teaching because he defined and characterized different signature pedagogies in design. He showed different teaching strategies and teacher profiles for them. The signatures help “to explain that learning to become a design practitioner is not simply a matter of knowing facts but is a much richer and deeper experience which requires a change of knowledge, behaviors and emotions.” [3, p. 83]

With another approach, design teaching is addressed by Lawson & Dorst [4] whose focus are on different levels of operations and cognitive processes needed to acquire design expertise through the development of specific student skills throughout training. They also pointed out that the way of teaching design is characterized by four fundamental elements that differentiate it from teaching in other areas of knowledge: the studio, design tutorial, crit and library.

In this sense, both Tovey [3] and Lawson & Dorst [4] emphasize the importance of the studio as marked by peer collaboration and learning in a shared space whose functions are loosely structured where different types of use are simultaneous. Design teaching is based on the teacher’s role during tutoring, which is performed in different ways: by addressing emphasis, use of time, focus, positive and negative aspects of design or by “suggested improvements and ways forward not just about process but, about product.” [4, p.252]. The design crit is also recurrent in design education literature, although it is criticized as to their efficacy in terms of learning, especially if it occurs only at the end of the course and thus there are just a few possibilities for incorporating suggestions into the final project. [4, p.256].

The use of libraries by students and teachers of design is also peculiar. It is based on the search for references for specific aspects of the project in progress, such as images from other inspiring design projects, or methods, techniques and tools for data collection or to stimulate creativity, or the search for specific technical solutions [4, p.260].

Other references were used for the construction of the pedagogical project. The Resolution No 5 from 2004 of the Brazilian National Council of Education [5], which approves the national curricular guidelines for Undergraduate Design Courses defines the competences and skills required for the formation of
bachelors in Design: Creative ability to propose innovative solutions mastering techniques and processes of creation; Knowledge of visual language for the expression and representation of concepts and design solutions; Ability to interact with experts from other areas in the elaboration and execution of research; Ability to interact with experts from other areas in the creation and implementation of projects; Systemic project view; Ability to conceptualize the project taking into account the economic, psychological, sociological and material aspects; Knowledge of the productive sector in the areas of product and graphic design; mastery of production management processes (quality, productivity, factory layout, inventories, costs and investments, human resources); Historical and prospective view of the design area and awareness of the economic, social, anthropological, environmental, aesthetic and ethical implications of the design activity.

4 RESULTS

The new pedagogical project maintained the aim of providing a generalist design education along a five-year course. The curricular grid has changed as a result from the reduction in the number of compulsory disciplines and the increase of electives, giving the students a wider range of options to choose from. A comparison between the old and new curricula reveals that the percentage of elective disciplines changed from 2% to 30%.

The study on design theory and design education was important in helping to organize disciplines over the five years of the course, considering the increasing complexity of cognitive skills and competences to be acquired by the students.

The main innovation was the creation of the elective design disciplines called (EDM) Elective Design Modules and (IDM) Integrated Design Modules. Those disciplines run on a bimonthly basis on fixed days of the week in the hope of decreasing the number of simultaneous projects developed by the students, facilitating the integration among students of different levels and providing them with more autonomy so as to make undergraduates partly responsible for their education path. The EDM disciplines involve the development of visual, product and/or service design projects, and are taught by professors from the Project Department. The IDM disciplines deal with interdisciplinary projects with the joint responsibility of professors from the Project Department and from other Departments or Schools.

FAU USP Design Course has a generalist character and values the comprehensive training whose final activity is design practice. It seeks to offer a consistent mapping of the territory of design and to train professionals who will be able to understand the current world and to establish relations between technology and society, contributing in their work to an ethical and humanistic vision.

Design practice is the core of the course, to which knowledge converges. 50% of the course disciplines revolve around design development. The contents are organized in terms of the user’s perspective and the contextualization of visual, product and services design in different scenarios, seeking, whenever possible, to embrace and integrate interdisciplinary knowledge through the interchange of theoretical and practical disciplines. Different schools of the university (School of Architecture and Urbanism (FAU-USP), the Polytechnic School (EP USP), School of Business and Economics (FEA USP) and School of Communication and Arts (ECA USP) contribute to the formation of interdisciplinary knowledge, which is essential to the bachelor's degree in Design.

Studies, workshops, laboratories and classrooms are the spaces for teaching and for design development. In those places, close relations are maintained between theoretical and practical contents, in order to nurture design thinking, integrating conception, development, construction and communication. These environments serve both to teach design and to build models and prototypes, leading to the development of skills and competences related to learning by doing, and stimulating the student to think, frame problems, create, propose, construct, verify, simulate and validate.

4.1 The curricular grid

The first two years (Table 2 and 3) were planned in such a way that students get in touch with the technical, technological, historical, aesthetic and cultural contexts, as well as experimentation and sensitization exercises in visual languages. The first two semesters have a propaedeutic character. They prepare the bases for later pedagogical processes.
The third and fourth semesters (Table 3) are transitional. It is here that the first experiences in design occur, in synchrony and articulated with theoretical contents. The introductory disciplines in visual design, product design and service design address classic and essential design issues such as signage systems, and the development of low complexity products. They occupy three days a week, and therefore most of the academic workload in those semesters.

The disciplines of the third semester are articulated so as to focus on a single theme, optimizing design research time. However, each one maintains its individuality in the execution of proposals, which differentiates this model from others where an integrated design proposal creates a dependency relation between design processes: if one of them is not successful the others end up being impaired. In the same semester, methodological bases are taught in the Design Methodology discipline. This contributes to a better organization of the design steps in all three design disciplines. Different methods and tools are offered to students, thus expanding the repertoire and maintaining the specificity of different design disciplines.

In the fourth semester, a discipline called Integrated Project seeks to consolidate the design tools. It has double workload and occurs on two days of the week. Its objective is to propose more complex subjects, in which project competencies are tested in exercises that favor overlap between structural aspects of product, graphic aspects and aspects of services. In this case, the interdisciplinarity is within the discipline itself, which should be taught by expert teachers in product design and in graphic design.

The next four semesters (from the 5th to the 8th semester, Table 4) are considered the professional core of the course, in which there is a considerable increase of complexity of contents, themes and of the proposed problems. They seek to establish connections between experiences in design practice with different aspects of historical, cultural, technical and technological thought.

During these semesters, another level of cognitive demand is required, and design thinking is contextual. In these four semesters students can choose the elective design disciplines (EDM, IDM) they wish to follow. They should enroll in two bimonthly design disciplines during the semester. On the one hand, the design development is more concentrated because it occurs during less weeks, but on the other hand it is more focused. There are no other design projects being developed by the student at the same time that could compete for attention and efforts. The elective design disciplines EDM and IDM encompass
a greater diversity of themes and areas of design, allowing students to have more projective experiences during their training, reinforcing the project-centered strategy for training designers.

Table 4. Disciplines of the 3rd and 4th years.

<table>
<thead>
<tr>
<th>5th Sem.</th>
<th>(EDM) Elective Design Modules and (IDM) Integrated Design Modules</th>
<th>History of Design IV</th>
<th>(EDM) Elective Design Modules and (IDM) Integrated Design Modules</th>
<th>Brand management</th>
<th>Design, environment and sustainability</th>
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<td></td>
<td>Ergonomics II</td>
<td></td>
<td>Interactive computing</td>
<td></td>
<td>Sign Theory</td>
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<td>6th sem.</td>
<td>(EDM) Elective Design Modules and (IDM) Integrated Design Modules</td>
<td>Contemporary Urban Culture</td>
<td>(EDM) Elective Design Modules and (IDM) Integrated Design Modules</td>
<td>Methods and means of production</td>
<td>Elective disciplines</td>
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<tr>
<td>7th Sem.</td>
<td>(EDM) Elective Design Modules and (IDM) Integrated Design Modules</td>
<td>Elective disciplines</td>
<td>(EDM) Elective Design Modules and (IDM) Integrated Design Modules</td>
<td>Communication Design</td>
<td>Viability and Project Design Management</td>
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<td>Innovation and Entrepreneurship</td>
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<tr>
<td>8th Sem.</td>
<td>(EDM) Elective Design Modules and (IDM) Integrated Design Modules</td>
<td>Law, standards and professional ethics</td>
<td>(EDM) Elective Design Modules and (IDM) Integrated Design Modules</td>
<td>Elective disciplines</td>
<td>Audiovisual practices</td>
</tr>
</tbody>
</table>

Thus, the student of the Design Course, who once could have taken only two elective disciplines, is now given the option of choosing from 13 to 18 that ideally should be offered to groups of 15 students. The elective modules were created in order to allow a balance between the greater offer of disciplines and the availability of teachers and physical space to develop those activities. The following EDM disciplines have been proposed:

- EDM: Design for Mobility and Transportation
- EDM: Humor and Design
- EDM: Design for Specific Users
- EDM: Laboratory of the Future
- EDM: Design and Biomimetics
- EDM: Design for leisure times
- EDM: Design, space, ambiance
- EDM: Unit, Family and System Design
- EDM: Design for Health and Well-being
- EDM: Information Design
- EDM: Editorial Design
- EDM: Book and visual narratives

The IDM disciplines were also designed to allow the integration of knowledge from different but complementary areas of design: engineering, architecture, communication and the arts. Thus, the following IDM disciplines have been proposed:

- IDM: Design, Materials and Production
- IDM: Design, History and Memory
- IDM: Animation and Videoart
- IDM: Design for digital environments: information, interface, interaction, action and collaboration
The ninth and tenth semesters (5th year, table 5) are considered the closing of the design training cycle. The student develops a Final Degree Project throughout the year. This project is individual, covers topics related to the design field and can be practical or theoretical. The student is tutored by a teacher during this period.

<table>
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<th>Table 5. Disciplines of the 5th year.</th>
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<td>9th Sem.</td>
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<tr>
<td>10th Sem.</td>
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</table>

5 CONCLUSIONS

The new curricular proposal adequately met the requirements established from the diagnosis. The flexibilization of the course offered by the introduction of the EDM, IDM and other elective disciplines can be predicted from the diversity of themes and approaches proposed, and the increase in design workload meets the needs established in the theoretical framework.

The new organization better articulates propaedeutic, projective and theoretical-technical knowledge, creating an identity for FAU USP Design Course. The inclusion of service design along with the more traditional product and graphic design branches can be considered a major advance within the structure of the course, as well as an opportunity for new articulations with teachers from other USP schools.

The withdrawal of the simultaneity of three different design projects per semester will surely allow students to focus on a single design activity, which results in greater organicity, less stress and better time management during the semester.

The elimination of architecture and urban design disciplines from the curriculum gave more focus to the course, ensuring its specificity within the design field.

An important aspect to be highlighted in the new curricular proposal was the concern with the feasibility of it regarding the teaching workload and the guarantee of offering disciplines during all five years. In this sense, both the teaching workload limits defined by the university regulations were respected, and the workload of teachers who were already involved in the course were kept.

REFERENCES