DEFSA-Conf 2006 Research Paper

Serena Selva
UdR ProgettoProdotto, Dipartimento INDACO, Politecnico di Milano
Via Durando 38/a - 20158 Milano, Italy
e-mail: serena.selva@polimi.it

A Design Studio to the Faculty of Design - Polytechnic of Milan: a link with the history.

Introduction

In order to understand the origin and the development of the Italian designer's training, it is crucial to show the industrial and cultural context of this country, which made the 'Made in Italy' successful.

Products nature is certainly what has mainly contributed to such success, but product is only the output of an original industrial structure, as Italy was different from other countries with the same economic development: it has taken up a production system going by routes different from the big industry - economies of scale, standardization, serialization.

The reasons for this difference depend on handicraft shop tradition, typical of Italian economy until the second post-war period, in which a shop started to expand, becoming a small 'firm' with a family management. These firms, thanks to their nature, were characterised by high specializations in several production divisions. Peculiarities that brought a production area to success, but reductive if they were not linked to other specializations/production systems. It was thanks to this reasoning that a network of firms came out, joining several specific competences to obtain highly innovative products.

The traditional handicraft skills, besides leaving a high specialization, contributed to the origin of Italian industrial sectors. This was due to the development of Italian handcraft culture, according to which requirements, raw materials and geographic characteristics of some specific areas, as a result of some specialized sectors, turned into industrial sectors like furnishing, footwear, textiles, machine tools, household appliances, mechanical engineering and so on.

After the second post-war period, Italian industry developed, thanks to the demand of goods that the middle class, very careful of their image, requested. The kinds of goods requested are related to house, as furnishing and household appliances, fashion, specially footwear and clothes, transport - we can mention, as regards this period, the creation of Vespa Piaggio, as a symbol of Italian design.

These examples, characterised by an evident relation among project, technique and production, came out and developed in industrial contexts with different production and market structures, are the origin of the 'Made in Italy'.

Product Design at the Polytechnic of Milan

One of the firsts product design teaching experience at the Polytechnic of Milan

In Milan some specific production areas developed, at first related to furnishing, textiles and household appliances. This development accounted for the existence of a furnishing training at the Faculty of Architecture in Milan in the 50s, the same period in which Italy began to think about design teaching.

As years went by, the exigency to train designers for industry, as a consequence the first design module came out, and they were called 'Artistic design for industry'. This name was probably due to the planning/design, which derived both from a technical/industrial context and from an artistic movement, the Rationalistic Movement.

Such relation belonged to the 30s, a period in which some Italian architects realized the existence of a discipline with its theory and the interactions between art and industry.

In Milan it was necessary to train designers able to interact in the relation between 'artistic culture' and 'industrial culture' existing in Italy.

According to the method of the above-mentioned departments, the students of Architecture Faculty were not trained as industry managers, because it was crucial to let them understand the process through which the designer's creativity was linked to opportunities to make it real, as in that period (the 60s) facing the rooting of industrial culture was necessary.

This concept was strongly emphasized by one of the first teachers of design at the Polytechnic of Milan: Marco Zanuso. He started as an architect, later he had to do with design and became one of the founders of the 'Made In Italy'.

The ideas of this designer have emphasized an unofficial method of design teaching within the module of the product design, based on the concept according to which a design activity cannot be

direct and individual, as it happened in the 50s, creativity could not be conveyed only through the isolated wit of an artist or an artisan, not through the direct interaction between material and content, workshop and production. Since the second post-war period the design activity has changed, it has been characterised by a greater amount of data and knowledge, where the usage of materials and speeches for the ideational and practical management and control are crucial.

Zanuso's teaching was focused more on that stage between the planning and the execution of a process than on the design subject. According to Zanuso "conceiving, planning do not grow and do not live anymore within a production process, but outside, in a more extremely complex process in which several elements belonging to any design sector interact. Designer modifies his identity as he is not completely focused on his intuition, his experiences and his job but he can be considered as a runner on a very complex field, trying to get useful information to improve and define his plan considering rules imposed by industry. It is not and cannot be subordinated to creativity, but industry becomes an important element of an interactive relationship, in which it represents a source of artistic creations, component parts, materials, systems, processes, essential items for planning."

This is Zanuso's thought at the Faculty of Architecture, exactly at the studios of 'Artistic design for industry', a method imprinting on a student what happens when they plan, emphasizing the concept according to which 'making a plan' means 'manage a process' not 'to do a drawing', as this is only a mean of communication towards the client and the intermediate interlocutors.

Analysing the teaching approach and process used in these studios and the stages faced by a student to reach the task of a project, we can understand the reasons for some choices, both structural than methodological, used now within the departments of product design at the Faculty of Design of Polytechnic of Milan.

As an example we can mention an experience of Zanuso and his assistants teaching with him at the design course, during a short-term project. Zanuso usually fixed a time limit for students, within three or four weeks to carry out a project. This was made up of three steps: the first one was based on deciding and introducing a brief of project to students, so during the first lessons were explained the groundings of the subject, showed previous similar projects and illustrated technologies useful for performing the task. In the second step students went on in the treatment of the subject and teachers helped them not mainly talking over an idea of a student but finding out the consequences of that idea, leading him to get the complexity and the implications of their project little by little, finally achieving the right degree of coherence and close examination of the stage between the starting idea and the performance of the task. The aim was to understand that a project could not only be neither an idea nor a drawing but decisions derived from the will of a designer and the elaboration of information, complex and different, aiming at the execution and the following check of both formal and technological reality of a project as idea.

In the third step teachers were the clients of the project of their students. Knowledge offered by the teacher together with behaving as a client, emphasized the need of interacting with industry.

This process of teaching stresses that theoretical contents – for example, previous similar projects to the brief introduced to students, properties of materials – should be compared with the practical technical knowledge.

Inductive teaching and market opportunity

These above-mentioned methods have never been applied until the 80s by Italian University – but also most of European universities – as it used a method of teaching called 'deductive'. In this case training was seen as an orderly systematic process in which theoretical contents, knowledge, were the basis of a process of training and they were taught before practical technical contents, the know-how, considered as a consequence and left at the end of this process. In most of disciplines this part was faced when the trainees started work.

The clear division between knowing and knowing how to do and the sequence of stages reflect the arrangement of production sector, typical of Italy until the 80s, characterised by a strong top-down business administration, a strong division in the distribution of tasks, a distinct individuation in technical management and administrative roles.

It was at the end of this decade that this organizational method showed its frailties, so that it was necessary a reassessment of the business system, in which roles and tasks a staff have been modified, hierarchies have been simplified and processes streamlined. Through this conversion manpower and knowledge were considered as a distinguishing mark, as a consequence not only opportunities to enter the market and to find material goods.

The new awareness of the importance of knowledge, as one of the crucial elements of the productive-economic system, together with the reassessment of business organization, made University reconsider knowledge conveyance so much, that it doubted the potentials of the 'deductive method' and it considered a new method, the 'inductive method', as it is called now.

This type of method supports the parallel between knowing and knowing how to do, theory and practice, consequently it connects the two different sources of Italian design: art and industry: the former is certainly based on theory and history, the latter on knowing how to do.

Tasks derived form teaching through a inductive method join these elements in order to let the new designer to grasp features of Italian design.

Being aware that knowledge was becoming a crucial element within industry, in the 80s it was necessary to separate the discipline of industrial design from architecture, to subordinate industrial design to requirements and schemes of industry.

Polytechnic of Milan - Faculty of Design: main features

The first degree course in Industrial Design was launched in Italy in 1993, joining key elements of the faculty of Architecture (centred on an artistic point of view) and Engineering (centred on a technical standpoint), in which the training process is inductive. This process supports the parallel between knowing and knowing "how to do", or theory and practice; consequently it connects the two different sources of Italian design: art and industry. The former is certainly based on theory and history, the latter on knowing technique.

The inductive process is considered crucial and this is mainly due to the existence of teachers within the Faculty conveying the knowing; and businessmen and visiting professionals conveying the 'how to do'. The choice of having 3 different figures (academic lecturers, professionals and entrepreneurs) as mentors, makes the student's journey to the outside world different from an academic context, providing them with the necessary skills and competencies to enter industry.

The courses are numerous and they meet the needs of Milanese industry as it was for the first courses at the Faculty of Architecture.

The Master degree courses that take place are Product, Fashion, Interior and Communication Design together with the recent Design & Engineering.

Each course has its own training program but the structure is the same and the subjects involve some specific tasks of practice, considered as the teaching centre at the Faculty: "knowing" and "knowing how to do".

Students attend courses characterised by knowing, as they are characterised by theoretical contents, like Mathematics, History and Marketing called Thematic Courses and others focused on both the area of knowing and knowing how to do, offering the overviews of ample issues that play a particularly important role in the contemporary context. They cover more than one discipline or specific context and this the reason for calling them, Integrated Courses like "Technology & Environment" or "Society & Communication".

Workshops are also based on the concepts of knowing and knowing how to do, characterised by disciplines partly practical and partly theoretical.

This teaching method establishes some project activities for students, who conduct activities both to familiarize with the tools of design as in the case of Drawing and Visualization Studio and the Computer Graphic Studios and to learn professional routines as in the case of Industrial Design Studio.

As regards the above-mentioned workshops, the inductive method is considered crucial and this is mainly due to the existence of inner teachers of the Faculty – conveying the knowing, and businessmen and outsider professionals – conveying the knowing how to do.

The choice of having three different figures as such teachers, means the need for leading the student to the outside world different from an academic context, providing him the necessary groundings to enter the working world.

Considering the Industrial Design workshop within the Degree Course of Product Design, a strong connection with the first above-mentioned courses/workshops of Italian Industrial Design emerges; indeed management skills in the planning of a project – element favoured by Zanuso - are requested to students, future designers. This means knowing how to correlate their own knowledge in order to

perform the project of functional, technical, formal, aesthetical together with a combination of materials and technological bright ideas of the 'design object'.

It is evidently necessary that these features are connected to the socio-cultural context and to an economic-managing point of view in order to interpret and satisfy business trends, demand and consumer's trends.

These needs are showed within the Design Studios of the Product Design Course, during the whole training course, both in the three-year Bachelor Degree and in the two-year Master Degree, and in Specialization Courses of the Faculty.

A product design studio at the Polytechnic of Milan

In order to understand the course, the procedures and the results requested by the Studios of Industrial Design, it is important to tell the experience of a group of students attending a Specialization Courses in Design for the electric and electronic domestic appliance industry (year 2004) and this is one of the University Specialization Course that the Faculty has launched to continue the relation between university and industry.

A specialization course is a course provides for the involvement of students culturally trained but specializing in specific areas. Consequently it has been organized in order to have many classes on product design and to construct these products by an optimum level of production many household appliance firms have been involved. These firms were engaged in the course, first proposing a brief and then training the students during the development of the project providing the technical and specific tasks of the production.

The author decided to describe this module because it is the summary of what normally happened in a Design Studio (Bachelor or Maser degree) where a pupil of Marco Zanuso taught (Professor Francesco Trabucco).

Prof. Francesco Trabucco taught product design with Prof. Matteo Ingaramo and both of them used a similar process showed bellow (Figure 1).

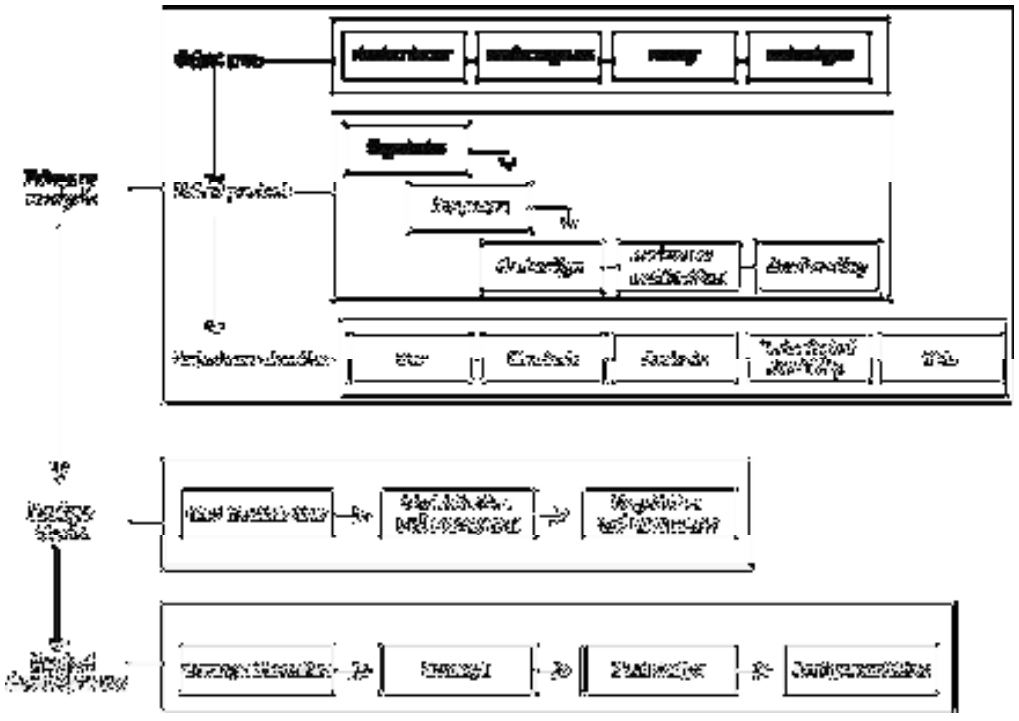

Figure 1- A teaching process within a design studio at the Polytechnic of Milan

The overall goals of the Design Studio were:

- to acquire information about the product and its wider context.

- to acquire the capability to design a product or a product line, including technical, functional, market, production, cultural and user centred aspects.

- to apply innovative design to specific types of products.

The teaching was characterised by three main macro-phases:

a. Primary analysis: definition of the problem to be solved, negotiation by each student group with teachers;

b. Defining goals: definition of solutions presented by each student group and approved by teachers;

c. Developing the project: description of the solution; proposed by students and agreed by teachers according to an appropriate feedback cycle.

In detail the phases previous draw up are:

a) Primary analysis

a.1) select area:

Product Sector

Topics: Research on the size of the market, on the production needs and the economic conditions on the industrial field related to the macro-areas. The role of localised or global companies in the production system must be identified, referring to the local situation and global worldwide trends should be sketched out. The production capability and strategic approach of the companies should be outlined, to maintain a coherence with companies' expectations for the proposal of new products.

Requirement: Identification of global market trends: volumes, prices, competitions and goods flows between the countries. Description of: Geographical area (world scale); size of the market (local scale); industrial sector - general information (local scale); industrial sector (local scale).

Market Segment

Topics*:* Setting from given market conditions at a global level. Market features at a local level (student country). Turnover of export and of local destination of the products and real and potential size of the market compared to the market share of other sectors. Volume of trade referring to the macro-area of the chosen products.

Requirement*:* Market survey at a local level (local scale); turnover of export and of local destination of the products (local scale); real and potential size of the market (local scale).

History

Topics: Starting from given historical information about the products belonging to the macro-area. Aesthetic and functional evolution of the local scale. Explanations and technical cards, market information will be provided by the lecturers.

Requirement: Cultural, social, economic and industrial context (local scale): case histories of representative products; birth of the products; aesthetic evolution (material, cultural context, fashion, etc.); functional evolution (use, environment, technologies, industrial output).

Technologies

Topics: Technical information referring to the product sector and its most typical products. Focus on the main features of the products included in the macro area.

Requirement*:* Operational information: energy supply; Mechanical and/or electric parts: components and their function (operation charts); and Identification of :

Material: functional and aesthetic parts (shell, control elements, etc.)

Manufacturing processes of the parts: moulds, extrusion, etc.

Assembling processes of the parts and criteria: manufacturing output organization (automation, out sourcing, etc)

a.2) select product:

Negotiation

Topics: Selection of a product to analyse

Conditions of choice of the product: ownership of the product

(Note: the product must be industrially produced and it must have at least one mechanical or electrical part inside)

Requirement: Reasons of the product choice (the extent to which it corresponds to the condition of choice; the extent to which it corresponds to the product sector and market segment analysis; the extent to which it corresponds to the macro-area selected; any other interesting elements)

Identity Card (ID card) of the product (Product images: from front view, perspective view, side view; Product name; Manufacturer; Brand; Date of start/end of production; Price; Production volumes (per year); Countries of distribution; Designer; Correspondence to brand identity (short description))

Acceptance

The lecturer must decide if the product choice is conforms to conditions described in "Negotiation".

Product Type

Topic: Product analysis by individual components.

Requirement:

A global view of the product (photos or drawings of the product, scale 1:2 or 1:5 or 1:10, with units of measurement in mm: front, side and top (bottom if necessary) and a view of the product with sizes (height, width, depth))

Synthetic written description of the product's main features (main functions, Energy supply, Particular functional features of the product (with comparison to similar products))

Identification of the principal parts of the product (exploded drawing or photo with indication of components)

Description of every part of the product: Name; Photo or drawing of the component (perspective, front, side, top and bottom if necessary) with indication in mm of sizes (height, width, depth and weight if necessary); Function; Material of production; Technical features of functional part.

Product use and functions

Topics: Critical aspects concerning functions, ergonomics and usability of the product. Observations on dysfunctions and difficulties in several situations of the product use.

Requirement:

Description of the situations and the use of products (images, photos, drawings, sketches or/and text)

Use of product: where (environments and situations), when (typical occasions), how long (typical periods of use), how (difficulties during use), maintenance (cleaning, parts replacement, etc)

Ergonomic features: interface, semiotic aspects, dimension of the parts that are in interaction with the user (in relation with anthropometric data)

Benchmarking

Topics: Identify competitors' products.

Requirement: Identity Card (ID card) of every product (Products description: Name, Product image in perspective view, Manufacturer, Year of production, Price, Main features, Designer)

a.3) *Project construction:*

User

Topics: Analysis and identification of real and potential users of the product.

Requirement:

Identification of trends about life styles and consumption - local scale - (in relationship with what was analysed in product sector and market segment), cultural and social aspects of contemporary context, ethnographical studies, family structure, educational level, market trends, statistical data about families' economic situation, overheads, etc.

Description of product use (Interpretation by images):daily and extraordinary situations of product use; situations; environments; any other points of interest.

Identity Card (ID card) of user category (Chart with features of a potential user; Name, Age range, Main daily activities; Social context; Expectations; Scale of values)

Standards

Topics: Regulations about the production and the functions of the products of the selected macro-area.

Requirement:

Regulation - Indicate the laws (local scale if the product is only for a country, word scale if the product is for every countries about Materials, inside/outside of the product, manufacturing, any other point of interest)

Safety: position of mechanical and electrical parts; size of the parts (e.g. air inlet); parts that are required (e.g. a cap in a mechanical part); compatibility (electrical, electronic, electromagnetic, gaseous, etc.) any other point of interest.

Maintenance

Analogies

Topics: Analysis and identification of existing products or other kind of solutions (similar to the expected functions of the product) in the same sector and in any other sector.

Requirement: Identity Card (ID card) of every product (written data about every product): Name, Image of the product, Manufacturer, Main Functions, Type, a written report containing the reasons for the analogical choice, which may relate to Function, Technologies and Materials.

Technological Availability

Topics: Applied and innovative technologies, materials and manufacturing processes compatible with the new product's functions.

Requirements: Description about:

Technologies (e.g.: If I have to cut a sheet of paper: paper cutter, water laser, punch, etc.)

Materials (e.g.: For a insulating handle: wood, plastic…)

Manufacturing process

Style

Topics: Research about stylistic approaches to the product area. Identify a reasonable number of products with a different style.

Requirements:

Identity Card (ID card) of every product: Written data on every part with Name, Image of the product, Manufacture, Year of production, Designer, Style description in reference to well-known products .

One of the requirements of this “Design Studio” is to keep the product to be re-designed in mind, and possibly to examine its internal structure, by dismantling or opening it. The selection of the goals is strongly influenced by this. Each student proposes and selects their own pathway, and this aspect influences the costs, as well as the quality of the results, avoiding standardised solutions, but enhancing personal capability.

b.) Design Goals

The students define, propose and agree a design brief for the re-design of the selected product. The individual steps are shared in the virtual workspace if they are considered useful by teachers and tutors. Three phases are identified:

b.1) Goal identification: to define design intentions and expectations.

b.2) Brief definition: to transform goals into a remit, presented to a potential customer.

b.3) Negotiation and acceptance: to decide on the final work to be done.

In detail the phases previous draw up are:

b.1) Goals Identification

Topics**:** Declare design intentions and expectations (referring to the analysis and the information acquired during the previous phases)

Requirements:

Identification of improvement to the product (in relation with what students analysed in Product type phase, Product use and function phase, User phase, Standards phase, Analogies phase and Technologies Availability phase).

Sketches and graphics (freehand drawing)

b.2) Brief definition and Conveyance

Topics*:* transform the goals into a brief to be presented to a potential customer

Requirements: draft of the brief

Description of: Expected function; Company and brand type; Price level; Expected Manufacturing features; Potential users; Innovation advantages;

Drawing and sketches of the product.

b.3) Negotiation and acceptance

Topics: Debate about the connection between the brief and the goals. Final acceptance of the brief of every group of students and exposition in the virtual workspace.

c.) Project development

In this phase students design their product. Every step is verified by feedback from tutors. Four stages are identified:

c.1) Concept discussion: description of the project.

c.2) Concept: definition of the project.

c.3) Final design: develop of the project.

c.1) Concept discussion

Topics: Description of the concept

Requirements:

Drawings: 2D and 3D sketches (perspective, front, side, top and bottom view);

Concept description: Functional layout of the product, Function user relationship, Setting the technological references.

c.2) Concept

Topics: Definition of the project

Requirements:

Drawings:2D and 3D models (perspective, front, side, top and bottom view according to the perceived needs by the author) with measurements in mm;

Project description: Shape and size definition, Technology employment description, Showing aesthetical and meaning substance (texture, colours, materials, etc.).

c.3) Final design

Topic: Definition of the project

Requirements: Project visualization

Technical drawings on a scale 1:1 or 1:2 (side, top and bottom view) with measurements in mm

3D models (maximum 10 models: inside views, shall, outside views, etc according to the perceived needs by the author);

Rendering of the final project (maximum 10 views of the product in a number of environments).

At the end there is a Final presentation and the requirements are: a Synthetic presentation of the project (.ppt or .swf file) with a description of technical features, aesthetic features, usability and ergonomics, marketing and communication hypothesis.

These three macro-phases of the Design studio were also analysed in detail in term of time spent on each area and the conclusion is that for the primary analysis the tome spent is 33%, for design goal is 25% and for Project development 42%.

Conclusion

The author has investigated and analyzed the teaching process and understood that within the context of globalization it is important that the students have a holistic vision of societal movements and key drivers forcing change over fluid geographic boundaries. As a consequence the initial exploratory phases of the design and development process are critical, because the primary analysis helps the students to understand and inform them of how to develop the final product.

Throughout this phase the students take up a third of their time within the design studio whereby they analyze the broader context about the product that they will subsequently develop. There is particular attention about the product sector and market segment, identifying the main considerations to understand how the product can be accepted by the marketplace. If for example the new or revised product is to be launched in different countries or continents that have, for example, different technical and legislative standards and perhaps the user(s) have different consumption and user habits.

Also the story of a product is really important because it enables the student to understand the evolution of the materials and the evolution of the technologies during the years and in particular, this analysis enables them to critically understand how certain changes have occurred and why these occurrences took place.

The benchmarking and the product in use function are two others [important] aspects to analyze; because the first element helps to know the differences between the products that seem similar but that have, for example, some differences about the mechanical operation or manufacturing considerations. The analysis of the product in use and key function enables the student to understand how the product is to be used in a specific context and how the users relate to the product; in particular if it has to be utilized from users with different cultural backgrounds.

All these phases are considered important for the students because it helps them to develop an individual method or approach of design development, but they also have the basis to develop a sophisticated and broad range of knowledge sets to know what is important to be a product designer.

One major aspect of industrial and product design and its successful practice in industry is 'learning by doing'. By undertaking studio-based research and design projects, the student can develop innovative products in a world where fluid socio-cultural and technological challenges emerge through the impact of new technologies and the development of new markets across international boundaries.

References and Citations

A.A.V.V. 2004. *2nd International Engineering & Product Design Education Conference*, Delft, The Netherlands 2-3 September 2004

Aldrich, R. 1996. *Education for the Nation*, , London, Cassell

Bertola, P., Penati, A., Seassaro, A. 2001. *La didattica del design. L'innovazione della struttura didattica e dell'organizzazione*, Politecnico. Rivista del Politecnico di Milano, Milano, Italy.

Bertola, P., Sangiorgi, D., Simonelli, G. 2002. *Milano distretto del design. Un sistema di luoghi, attori e relazioni al servizio dell'innovazione*, Milano, Italy.

Brint, S. 1998. *School and Societies*, Thousands Oaks, California: Pine Forge Press

Branzi, A. 1999. *Introduzione al Design Italiano*, Baldini&Castoldi, Milano

Bruono, D. 2002. *Learning design by design experience*, Edizioni POLI.D.design, Milano.

Celi, M. 2003. PhD research: *Design e-learning*, Tutor: Antonella Penati; Politecnico di Milano.

Chiapponi, M. 1999. *Cultura Sociale del Prodotto. Nuove frontiere per il disegno industriale*, Feltrinelli, Milano, Italy

Heskett, J. 1980. *Industrial design*, London: Thames and Hudson., UK

Heskett, J. 2002. *Design. A very short Introduction*, Oxford University press, Oxford.,UK

Maffei, S, Simonelli,G. 2002. *I territori del design. Made in Italy e sistemi produttivi locali*, Milano, Italy.

Morales, D. 2003. PhD research: *Rapporto locale-globale: nuova sfida ed opportunità progettuale. Il brasile come caso locale*, Tutor Andrea Branzi; Politecnico di Milano, Italy

Penati, A., Seassaro 2000. A. *Didattica e Design*, Milano, Italy

Pizzocaro, S., Arrula, A., De Morades, D. 2000. *Design plus research: proceedings of the Politecnico di Milano conference*, May 18-20, Milano, Italy

Rampino, L. 2004. *Scenari evolutivi degli elettrodomestici per la preparazione e conservazione degli alimenti*, Aracne Editrice, Milano, Italy

Sinopoli, N. 1990. *Design Italiano:quale scuola?*, Milano, Italy.

Steiner, G., 2004. *La lezione dei maestri*, Milano, Italy

Tedeschini, E. 1992. *Il Design: un approccio metodologico*, Città Studi, Milano, Italy