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The importance played by the professional education of industrial designers when incorporating ecodesign practices within the professional practice of design

La importancia que juega la formación profesional del diseñador industrial para incorporar el ecodiseño dentro de su práctica profesional

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ABSTRACT

The design activity has been marked as one of the professional practices with the greatest environmental impact due to strategic decisions made while crafting the material world, thus reflected in the damage that resulting objects coming from the design process generate: mountains of everyday us products that are manufactured by the millions, causing the depletion of planetary resources and generating all kinds of emissions and toxic waste throughout their life cycle. The results presented here are based on a doctoral investigation whose objective was to locate and describe how external factors reduce the effectiveness of the decisions taken during the design process; the present study centers on the part that professional formation plays. The study was centered on the industrial designer located in Mexico City and the metropolitan area, taking as a reference, the ISO 14006 standard, which governs the eco-design concepts to better understand the design processes it manages. The methodology used a detailed header research on sustainable design and its strategies, a diagnostic questionnaire carried out to industrial designers, with at least two years of experience working in small and medium-sized companies and an in-depth interview carried out within a panel of experts, who helped defining the problem, confirming the findings and, from their experience, guiding the process of incorporating sustainability into the professional designer´s work.

Palabras clave:
diseño, sustentabilidad, norma ISO 14006.

RESUMEN

La actividad de diseño ha sido marcada como una de las prácticas profesionales de mayor impacto ambiental debido al peso que juegan las decisiones tomadas al momento de configurar el mundo material, reflejado en el daño generado por los objetos resultantes del proceso de diseño: montañas de productos de uso cotidiano que se fabrican por millones provocando el agotamiento de los recursos planetarios y generando todo tipo de emisiones y residuos tóxicos a lo largo de su ciclo

de vida. Los resultados presentados parten de una investigación de carácter doctoral cuyo objetivo fue localizar y describir aquellos factores externos que reducen la efectividad en las tomas de decisiones a lo largo del proceso de diseño relacionadas con el cuidado medio ambiental; este artículo se centra en el peso que juega la formación profesional. Se hizo el estudio en diseñadores ubicados en Ciudad de México y zona conurbada, tomando como eje transversal la Norma ISO 14006, rectora de los conceptos de ecodiseño, para entender que procesos de diseño son gestionados por la misma. La metodología recurrió a una investigación de cabecera detallada sobre el diseño sustentable y sus estrategias, un cuestionario diagnóstico realizado a diseñadores industriales, con al menos dos años de experiencia laboral que trabajan en pequeñas y medianas empresas y una entrevista a profundidad realizada a un panel de expertos, quienes ayudaron a delimitar la problemática, confirmar los hallazgos obtenidos y desde su experiencia guiar el proceso de incorporación de la sustentabilidad al trabajo profesional de diseño.

Introduction

Everything that exists in the modern world is the result of an act of design (Norman, 1999), the physical manifestation of culture, where the lack of empathy with the natural world is reflected and where every decision, unconsciously irresponsible, that is taken in the process of construction and diffusion of products comes from such activity and the role played by the designer marks him as the main responsible (Capra, 1992, Papanek, 2005). Design is considered the material transformation of the world, suggesting that it is a practice that consists of diagnosing a problem, interpreting and analyzing it to develop creative ways to overcome it (Boehnert, 2018), implying by definition that the designer executes such actions, and therefore, responsible for the consequences, giving rise to the consideration that no activity causes greater harm than the way in which the material world is designed and manufactured (Papanek, 2005), when its ethical and moral work, is to create responsible products that incorporate efficient technologies in their life cycle, avoiding the degradation of natural systems but instead shows only a lack of adequacy to interact harmoniously with our natural environment, which makes design one of the activities with greater responsibility towards the environment (Capra, 2015).

Enzo Manzini (1992) states that it is the lack of a professional ethic that adapts to real problems and new sensitivities, specifically the environmental issue, offering new horizons to design and the opportunity for transformation, based on the values of an industrial society within a sustainable context.

Design is a powerful tool that has allowed the transformation of the natural state of existing environments towards preferred, although sometimes hyper-artificial and unsustainable states (Buchanan, 2001) that result in resource depletion, pollution and health problems among others, putting at risk the quality of life of future generations. Because design has fallen into an inability to generate lasting values, becoming obsolete, dangerous and unsustainable (Norman, 1999) has marked the practice of design as the main responsible. According to several authors (Papanek, Buchannan, Boehnert, Manzini, Thakara) more than 80% of environmental decisions are made during the conceptualization and design stage of the design process. For this reason, it is said that the problem of sustainability is a design problem (Thackara, 2005) and although there are strategies focused on minimizing the damage produced by design practices (e.g. eco-design), they are inefficient and insufficient to achieve the objectives of sustainable development, assuming that design has the ability to develop products that consider environmental factors, transforming the professional practice of design (Ehrenfeld, 2015).

The designer has the ability to implement the necessary changes, redirecting his or her efforts to transform the system he or she determines should be designed (Boehnert, 2018), mitigating the environmental damage derived from the professional practice of design. There are several concepts derived from the so-called eco-design, whose objective is to reduce the impact in the design practice; this concept was born within the so-called industrial ecology under the tenor of "*doing more with less*", a perspective rooted under guidelines proposed by neoliberal policies, where the important aspect is the economic and not the environmental. This limits the real scope that strategies such as the one mentioned above could have, because their main scope lies in the recycling of resources and the optimization of raw materials, without contemplating stages that produce a great environmental impact, such as obtaining the primary resource itself, its use and final disposal, which in the opinion of several authors, are processes that fail due to the lack of an integral vision that goes beyond the limits imposed on the professional work of the designer, who should go beyond and turn his profession into an innovative and creative activity based on solid scientific foundations that allow him to solve

human needs and at the same time stop the planetary degradation caused by poorly designed objects and services.

This research arose from the concern to understand how the professional training of the designer affects their performance in addressing an environmental problem, as well as to describe what are the obligations that every designer has, their skills, limitations and competencies, where the ISO 14006 standard played an important role in mapping the design processes managed by it, under the principles of the so-called eco-design. This standard becomes an important reference because it indicates exactly which processes the industrial designer is responsible for, lists them and suggests a series of recommendations to systematically reduce the impact by reducing material resources and energy.

This type of studies are carried out with the future objective of guiding the critical decisions taken during the design process, responding to the demands of a society interested in both the conservation of nature and the preservation of its lifestyle, in order to incorporate, subsequently, to the design work, different alternatives to achieve this objective, improving processes, instilling ethical values and integrating a cultural vision, turning this challenge into one of a strategic nature that contemplates all those involved (Chávez, 2016). Another objective of the doctoral research was to recognize the designer and the role he plays in the transformation and construction of the artificial world that surrounds us and the context within which design projects are developed.

This article presents part of the results obtained from a research conducted during the months of February to May 2021, which revolved around the design activity and its relationship with the environmental decisions taken during their professional work.

Method

Research design

As mentioned, this article presents a small portion of a doctoral research, where the main objective was to document the situation of design in Mexico City and the surrounding area, to understand the factors inside and outside the industry and to delimit the professional profile of graduates from universities that teach design or similar careers. In order to meet the proposed objectives, various tools were used, both qualitative and quantitative, taking as a starting point a mixed research, descriptive-explanatory type, whose objective was to relate the different actions and decision making, which lead to a cause and effect relationship between what the designer does (direct internal factors) and its effect on environmental damage; On the other hand, we sought to locate and understand those indirect external factors that affect the way in which the designer makes his decisions, determining both the indirect variables (decision-making capacity, manufacturing requirements, customer requests, etc.), and those direct variables (training, knowledge, professional development, etc.) and the role they play in determining the degree of environmental impact derived.

A diagnostic questionnaire was used to parameterize and quantify, as far as possible, the characteristics of such broad and ambiguous areas as the type of environmental management in companies, the implementation of eco-design strategies, environmental performance, responsibility based on the position according to the organizational chart and the objectives pursued by companies that hire industrial designers in Mexico City and the surrounding area, this information was nourished and corroborated by means of an extensive consultation of diverse sources of information and a series of in-depth interviews with a panel of experts, in order to define indicators and quantifiable concepts as parameters.

This questionnaire was nurtured thanks to the participation of a panel of experts, through the tool of the unstructured in-depth interview, which made use of an inquiry

technique known as "laddering", directing the interviewee in the direction necessary to delve into the issues relevant to the confirmation and complementation of the information gathered during the bibliographic research stage, and whose results were the basis for the generation of the diagnostic questionnaire. The three research tools were analyzed through data triangulation for final data interpretation and conclusions.

Participants; population, sample, and selection of key stakeholders

A mixed research, such as the one proposed in this document, starts with a small number of informants; in a participatory observation and qualitative interview, the number of informants is not known beforehand, but cases are added as the research progresses.

A maximum variation sampling is proposed, focused on those cases recognized as usual within the context under investigation, with the purpose of describing and understanding the central themes or characteristics of the actors interviewed; the informants that best represent the reality under study. It is also a non-probabilistic convenience sampling, since our main actor must cover a specific profile of essential characteristics defined by the nature of the study and be perfectly adapted to the proposed model.

The organizational chart of the companies with a design department was decisive at the time of selecting the sample population, the industrial designers, and the job descriptions in accordance with the Human Resources departments, and under these criteria, the selection of the objective population on which the questionnaire will be implemented was made.

The sample population presented was selected for its position within the organizational chart, as well as the power in critical decision-making and experience within the company, being the main actor, the industrial designer who develops his professional work within the field of product development and manufacturing industry in micro, small and medium enterprises in Mexico City and its suburbs.

Primary Sampling

The diagnostic questionnaire was applied to 106 industrial designers working in industries or companies located in Mexico City and its suburbs, who met the selection profile and agreed to participate by answering the questionnaire.

The criteria for the selection and inclusion of industrial designers to whom the diagnostic questionnaire was carried out, providing the most relevant information, were as follows:

- Industrial Design interns working as scholarship holders: This profile is taken into consideration because it is a common practice in the industry to hire interns who are in the last years of their career, in order to develop their internships or obtain professional experience.
- Recent college graduates starting their professional careers: Young graduates are more aware of the knowledge acquired during their training, so the information provided by them will be of vital importance, especially when it comes to understanding whether there is a relationship between what they have learned in their studies and their professional work.
- Junior Designers: Designers with less than 3 years of work experience, young designers who already have the necessary experience to be performing efficiently within a company, and who already know the processes within the company.
- Senior Designers: Designers with work experience greater than 3 years, who may or may not be able to fill a management type position due to experience. This profile is important because they already master a series of processes and tools thanks to their work experience; they are able to identify a methodological process inherent in the practice.
- Designers with an additional degree (specialty, master's, doctorate, etc.). Those who, in general, may or may not be able to fill a management position based on their qualifications. If any, they are able to identify the most advanced procedures and strategies that are not so obvious to designers without this degree of education.

The second part of the experiment consisted of in-depth interviews with a panel of experts: 15 specialists were interviewed. The purpose of the interview was to understand the context within which the work of the industrial designer is developed in Mexico, the historical background that frames the evolution of the professional work, the academic professional training, the competencies and the graduate profile, the current situation of the Mexican designer, the relationship between the industrial designer and sustainability in Mexico, and to define the profile for a new type of integral designer.

The criteria for the selection of the specialists were:

- Academy leaders with more than 10 years of experience involved in the teaching of the discipline, curricula and the definition of graduate profiles.
- Design theorists with several publications related to the fundamental aspects of the discipline.
- Industry leaders, both in the area of customer relations, design company management and production managers involved with product design and manufacturing projects (complementary sampling).

Complementary sampling: A group of secondary actors, who have direct interference with the work of the industrial designer and, therefore, with the results of the design processes, were identified during the questionnaire. These profiles will complement the profile of specialists who completed the panel.

The interview with these actors focused directly on the academic training of the industrial designer, design procedures, management of design teams and the implementation of environmental strategies within companies, as well as knowledge of standards and their practical application within the design industry.

These profiles, despite having an external participation, had a crucial role in defining the development of the projects, occupying positions located at the upper ends of the organization charts, interviewed in order to understand the level of direct impact that their positions have on the design processes.

The complementary sampling consisted of: 1) company general managers, 2) sales managers and their sales team, who express the customer's needs and serve as part of the panel of experts in the interview stage, and 3) managers of the product design and development areas.

Instruments

The questionnaire and its results: As mentioned, this instrument, consisting of 35 diagnostic questions, was applied to 106 industrial designers who met the established ideal profile and was applied online during the months of March and April 2021, using the "Google Survey" tool. One of its main objectives was to diagnose the degree of knowledge related to the concepts of sustainability, climate change, the impact of the profession and the different methodological tools available to them, ending with the identification of those variables that affect environmental performance.

Among the objectives covered by the questionnaire, two stand out: Identify the direct and indirect factors that affect decision making when developing a project; and to understand the role played by the academic training of designers and its relationship with the knowledge of strategies, causes and consequences.

The questionnaire addresses criteria of relevance and importance of the different factors related to the implementation of environmental strategies, the knowledge of these and the formation of competencies related to the sustainable aspect during the professional training of the respondents.

Analysis and Results Obtained

The questionnaire was divided into three blocks, defined as professional training, knowledge about the existence of ISO 14006 and the implementation of strategies focused on reducing the environmental impact within their workplace.

For practical purposes, we present the most relevant results of the section related to professional training, questions 27 to 31 of the diagnostic questionnaire, whose objective was to understand if university studies play an important factor when making decisions regarding issues related to environmental impacts.

Results

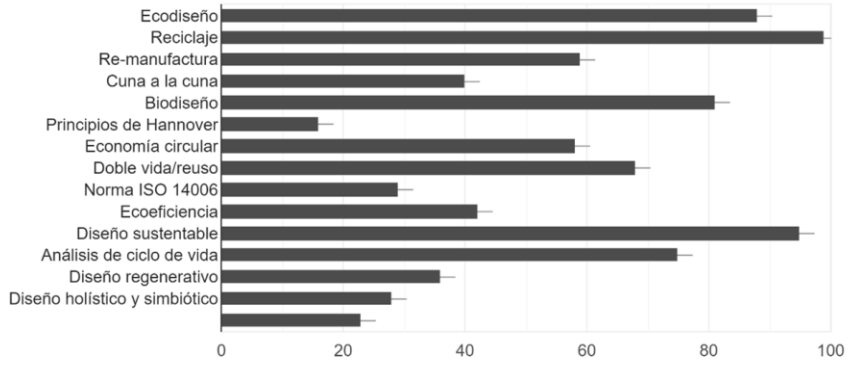
The following are some of the most representative data obtained during the application of the questionnaire to designers and their opinion about the processes they carry out and their environmental impact and the relationship between professional training.

The questionnaire focused on understanding, first, the professional work and labor situation in Mexico City and its suburbs, the second part was to understand the role of academic studies and their training; finally, they were asked about the incorporation of environmental strategies in their workplace. The focus of this article is to understand the part of the industrial designer's professional training.

First, questions were asked about the type and knowledge of environmental strategies. The designers claimed to be familiar with the following environmental management tools: Recycling (93.33%); Sustainable design (88.57%); Ecodesign (81.90%); Biodesign (75.23%); Life cycle analysis (68.57%); the concept of double life and reuse (60%). Interestingly, although many designers claim not to know about the causes and consequences of climate change and the role played by industry, the vast majority claimed to know about various preventive strategies, implying that during their professional training, they had to cover such topics, at least theoretically, but the various subjects did not connect with each other, providing only information, a cultural breviary on environmental issues, but without any practical value at the time of addressing a design project.

Figure 1

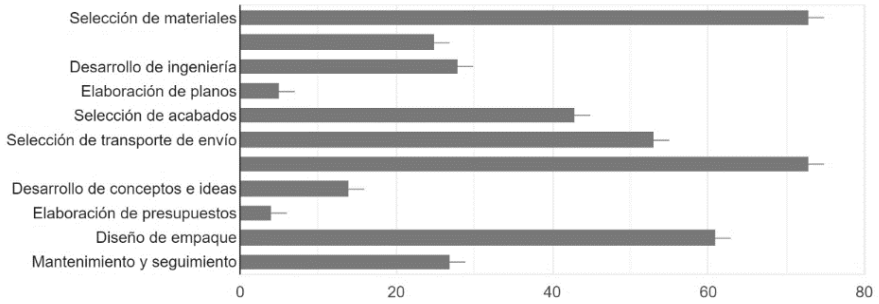
Knowledge of environmental strategies



Another important question asked was whether they were able to identify which processes within the industry generate some type of environmental damage; the results obtained, as shown in graph 2, were as follows: in first place the designers identified the selection of materials as the main aspect of environmental damage (70.47%), in second place they identified the selection of manufacturing processes (69.52%); packaging design (59.04%); transportation as the next factor (53%) and, lastly, the selection of finishes (40%).

Figure 2

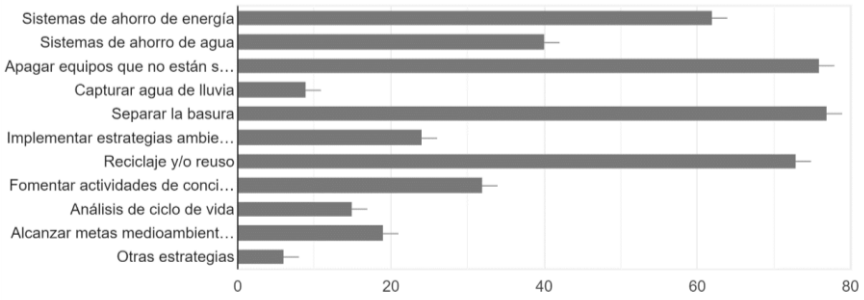
Design processes that generate the greatest environmental damage



To understand environmental responsibility within the companies, we asked about the incorporation of sustainable strategies in the workplace, with the following results: four main responses: turning off disused equipment (63.80%); separating garbage (59.04%); recycling strategies (56.19%) and using energy saving systems (51.42%). It can be concluded that most of the companies that hire designers do not implement strategies in the designer's work, they only use traditional strategies that seek to reduce the direct impact of the company.

Figure 3

Incorporation of environmental strategies in the workplace

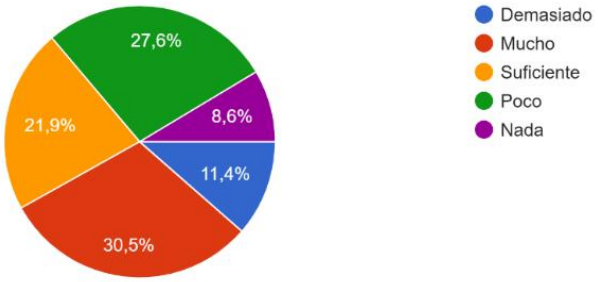


Another block of questions focused on understanding whether the designers consider that the decisions made within their workplace are related to the environmental element, obtaining the following results: 30.5% answered that decisions are closely related to environmental issues, 27.6% said that the company's decisions have little relation, 21.9% confirmed that they are sufficiently related to environmental issues, 11.4% said that these decisions have too much weight, and 8.6% said that they have no relation at all. Almost a third of the designers confirm that the decision-making process within the company has a lot to do with the issue of environmental damage and very closely, those who consider that it has very

little to do with it, showing that opinion is divided as to the role that decision-making plays when carrying out a project.

Figure 4

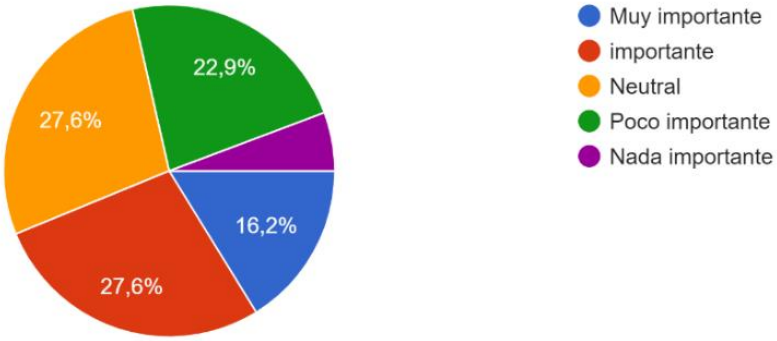
Importance given to the environmental factor in strategic decision-making



As well as the weight given to environmental values in decision making, we also asked about the degree of importance given to sustainability in business processes: 27.6% say it is important, another 27.6% say the company is neutral to these factors, 22.9% say it is not very important, 16.2% say it is very important and 5.7% say it is not important at all. This information was a recurring theme during the interviews with the experts, and indeed, in Mexico City, most of the companies that hire industrial designers do not give importance to the environmental element if it is not requested by the client. One of the reasons derives from the competition that exists between companies and for those customers who ask for the best price, punishing the environmental element. The results are shown in the following graph.

Figure 5

Degree of importance of sustainable values in companies.



The in-depth interview to the panel of experts, descriptive-evaluative phase, complemented the exercise and whose objective was to contextualize the situation of the Mexican designer within the industry, providing the guidelines under which the diagnostic questionnaire was structured and corroborating the results of the bibliographic documentation stage, in order to understand the dynamics that are generated in the work environment and the current situation of design in Mexico and through the triangulation of information, understand and describe the relationship that exists between the factors that affect the environmental performance of the designer, such as: professional training; requested requirements; the limitations, both technical and technological; indirect factors that affect decision making; the development of design projects and how is it that from such knowledge, to give greater meaning

to the results derived from professional training, seeking to create new synergies that nurture the work of design.

Different series of interviews were carried out; the first block of interviewees corresponds to those experts within the theoretical, historical and academic areas; the second block was carried out with leaders of Mexican companies that hire designers and actors within them who are the ones who interpret the client's wishes and transmit the information and objectives of the design projects. The last block of interviews focused on designers who work professionally in companies that implement ecodesign strategies in their processes or are environmental consulting firms operated by designers. As a result of this second phase, qualitative portion of the experiment, and whose purpose I seek to cover with the following objectives:

• Contextualize the situation of the Mexican designer within companies, their relationship with clients, projects and the way in which sustainable requirements could be integrated into their processes, as well as the challenges presented by the industry that hires industrial designers, with the purpose of proposing a new professional profile that will serve as a basis for universities to generate a new curriculum.

• Outline the current professional profile of the Mexican industrial designer, his or her procedures, practical tools, competencies and challenges, in order to analyze whether education truly covers the required profile.

• Understand the role played by the study plans and the incorporation of subjects related to sustainability within their academic projects, thus understanding the dynamics generated between theoretical knowledge and practical application, helping to discover areas of opportunity for the introduction of such topics in the professionalizing exercises.

• Through a historical analysis, understanding how the discipline of industrial design was introduced in Mexico, its development over time and how the specific profile of the design professional was defined; the historical context becomes valuable to locate and focus macro trends that reflect this new spirit of the younger population that seeks to be friendly and responsible with the environment.

Due to the limitations resulting from the pandemic caused by COVID-SARS2, these interviews had to be adapted to a variation of the DELPHI method with an in-depth interview. Also, through the interviews, we sought to contextualize the environment in which the industrial designer works in Mexico and to understand the current situation, the historical background, cultural, social and economic variables that affect the work of the designer, as well as to delimit the scope and limitations when incorporating strategies to prevent environmental damage.

The panel of experts consisted mainly of academics from the main design universities in Mexico (UNAM, Universidad Iberoamericana, Instituto Tecnológico de Monterrey, UAM Azcapotzalco and Xochimilco, Universidad La Salle, EDINBA and Universidad Panamericana), and who at some point were involved in making decisions to create or update the curricula; another profile of the interviewees was that of historians who have analyzed the evolution of design in Mexico, highlighting personalities of Mexican design such as Dr. Oscar Salinas, creator of the DESIGNIO publishing house, Dr. Julio Frias, former coordinator of the Arts and Sciences postgraduate program at UNAM, creator of the "Diseña México" award, Dr. Sandra Molina of CyAD at UAM, coordinator of scientific publications at that university, Aldo Pérez Jaimes, Coordinator of the Innovation and Design Engineering program at Universidad Panamericana and Ariel Méndez, from Universidad Iberoamericana, as well as Ana Charfen and Reneé Harari, specialists in design management and foresight.

Each in-depth interview was unstructured, based on some guiding questions, which were developed during the time of the interviews to delve deeper into the subject matter, adapted according to the profile, professional experience and specialty of each of the experts.

Conceptual and Pragmatic Reflections of the Research

The research yielded different results, depending on the approach considered. The following is the information obtained, which revolves around the designer, his activity and the environmental values within his practice: first, an efficient and effective designer must have a complex and comprehensive profile that allows him to take advantage of the methodological resources at his disposal, as well as different types of thinking to adapt to different activities.

The panel of experts made up of industry leaders mentioned that the current business and industrial environment presents designers with a much greater challenge: in Mexico, designers who decide to work within a company live governed by the needs posed by the national industry and within which, the designers they employ are forced to respond to the needs of the predominant economic system with little or no decision-making power, directly affecting decision making that revolves around sustainable values, and this results in a lack of control over the decisions that are made in the projects; this is the reason why a designer who seeks to propose alternatives that can generate a positive change, must be able to read, interpret and transfer various factors, mainly economic, political, environmental and cultural, reflecting them as an economic advantage for his company, and not as an added or ethical value, and to achieve this, the designer who considers incorporating an ethic of sustainable character from within the industry must count mainly on bosses and clients with enough openness to change the course of the projects and incorporate sustainability.

There are other challenges that the specialists interviewed mentioned, coinciding in the existence of these two: understanding where the designer stands, from a local and global perspective, understanding globalized systems and diverse cultural phenomena, and through this knowledge, offering solutions that provide a global vision; a second challenge is that the designer must leave behind the individualistic posture that characterizes him, integrating himself into interdisciplinary work teams, where the designer and his language can become a point of convergence of ideas, where the contributions of a team composed of professionals from different areas of knowledge are synthesized, becoming mediators and integrators, both challenges are evident in Mexico, where sustainable objectives are elements that are not well founded and for which the Mexican industry is not prepared to achieve them.

As for the environmental factor, the panel of experts confirmed that both the client and the industry seek to turn the problem around through deception, the typical case is to make something appear to be what it is not in order to overcome a filter, such as an environmental requirement that is not covered in its entirety, but it is also necessary to consider that an environmentally responsible client is not a guarantee of sustainability either, added to this, the supply of environmentally friendly materials is another important factor in Mexico, since there are few suppliers of healthy materials and those that do offer them are usually either too expensive or of low quality.

Discussion and Conclusions

If, in fact, these studies prove a problem within the academy itself, when training these professionals, not only the thematic content should be rethought, but also the scope that these subjects play. It is worrying to see that prestigious universities, such as the Universidad Iberoamericana, the first university to offer this career in Mexico since 1955, is eliminating sustainable subjects from its program, giving more weight to technical training that covers the professional profile required by companies; this is also a reflection of a major problem, where the labor environment is the one that dictates professional training. In the panel of experts interviewed, many indicated that these subjects hinder professional training, because it is difficult to incorporate these elements in the training exercises, while others, shielded by the

need to prepare new professionals who face other types of problems, which are within the competence of the industrial designer.

And although it is serious that design students lack the minimum knowledge necessary to address a complex issue such as sustainability, the big problem stems from the industry itself and the clients it serves; if the designer does not address it adequately, it is because there are several factors, both internal and external, intimately linked to their professional work and where company leaders and clients do not align their own objectives with the objectives of a sustainable agenda, here the key is in the values that revolve around an ethic focused more on economic issues than on environmental ones, and therefore, are reflected in the people who work in the industry.

Other factors, for example, mentioned by the panel experts is the importance of the fact that the designer leaves behind discourses that are rooted in archaic, simple and linear design thinking. Here professional training should focus on creating a new profile, a more competitive one whose main characteristic is to live immersed in the context, and whose function is to be a translator and configurator of all the components of a complex system, including the environmental one, through prospective and collaborative actions, generating the necessary components and an efficient reading of use to give a true sense and utility to things, thus reducing the impact that may derive from an inadequate use of the products resulting from the design process. These designers must pilot the integration of their ideals, becoming the standard that marks the way and the times, becoming a faithful reflection of the variety of cultures and thoughts within which they cohabit.

The designer must generate the filters that give the required effectiveness to transdisciplinary exploration and complex systematization, including all the participants of this complexity, including the environment within it, transforming himself to meet a new reality, that of a world that due to planetary limitations and the multiple existing crises, tends towards dematerialization, focusing its efforts towards the design of services, experiences and social innovation. Donald Norman (2007) emphasizes the need to return to a design that is neither ephemeral nor outdated, but rather to a more lasting design, a design of truly necessary and not banal objects, a social and responsible design that addresses real problems, reinventing itself, just as during the Industrial Revolution, when industry was the guiding axis, the new guiding axis is the need derived from the world crisis, which forces us to take a sustainable attitude, where the traditional vision of design becomes obsolete.

Professional training must generate designers who are restless, disruptive and capable of approaching systemic thinking, always seeking to propose a real change, and they will achieve this by detaching themselves from the traditional industry to become entrepreneurs with a highly developed social and environmental conscience and who bring new values to their proposals, aligning themselves with the real needs of users, their life context and the quality of planetary life, they must understand the need to reduce the scale of their projects and generate real value; they must also be integral designers who develop within the administrative, logistical, financial, communication, sustainable and life cycle fields, skilfully applying the tools of design thinking to solve all kinds of problems without losing their ability to express themselves through objects, because if they are only problem solvers or are completely devoted to administrative issues, they cease to be designers.

Especially in Mexico, a designer is required to respond to real needs derived from their own context, seeking a positive impact from their work, and this is where the effective teaching of useful and practical strategies can be achieved; the university must help the student to develop new skills, transforming the discipline of design from the critical and prospective reflection of it.

The designer who manages to create interesting, relevant and innovative projects, will be characterized by becoming a co-participant of the reality in which he/she lives, soaking in

the real planetary needs, so it is important that the designer develops within the collective work and the person to person relationship, experiencing first hand the context within which he/she wants to make a contribution, which requires a comprehensive vision and synthesis capacity based on empathy, implementing good practices, sharing the knowledge generated together with others, thus sowing the seed of true sustainability.

Currently, the traditional designer is completely anonymous, this anonymity provided by being an employee of a company, shields him from making ethical decisions when designing, therefore, he does not show any guilt or desire to change the way he does things, either because he lacks knowledge or because he aligns himself with what is requested; this designer, by moving up the hierarchy to positions where he could generate a change, perpetuates the disdain with which sustainability is approached, always in favor of economic gain.

But what about the other designer, the one who, despite living in anonymity, wants to make the right decisions and is committed to the planet? This designer must overcome limitations such as the weight of the economic point of view, one that focuses on savings and unlimited development where the main objective of companies is to generate profits through poor products derived from the cheapest possible manufacturing, regardless of the final destination of these designs or the ethical responsibility that should be taken towards the planet, factors that directly affect the sustainable innovation that the designer could bring, one who does not have enough tools to achieve a positive change at the environmental level and can not bring a major change from his position within the company.

But the designer must be trained from their academic training to introduce a real change, but above all to create an environmental awareness and empathy with the environment in which they live, fortunately today designers are exposed to a constant global media bombardment that allows them to see everything that happens in the world and the consequence of our actions. They are aware of the effects of their lifestyles and decisions, and seek to incorporate a positive change through their work, taking the reins by becoming leaders that guide companies by demonstrating that a business can be profitable, ethical, conscious and build their discourse transversally within the different stages of project development, and the only way to achieve this is through the implementation of sustainable values in each of the stages of their work and the life cycles of what they design.

The ideal designer, who manages to incorporate these values, starting from a resilient vision, becoming an individual who has the need to guarantee the quality of life, preserving its integrity and cycles; a new designer, resilient and symbiotic, who pursues the integral protection of ecosystems and their regeneration, social equity, community participation and the concern for generating welfare futures for all living beings and who also has a broad understanding of the planetary limits and natural adaptive cycles, as well as their practical application (Sanchez, 2013).

These designers must be negotiators of value, facilitators of thoughts, visualizers of the intangible, navigators of complexity, mediators and coordinators of exploration; some of the tools they resort to are resilient thinking, biophilia, biomimetics, and a deep understanding of the concepts of symbiosis, which must be taught in their training, not only at university, but from the moment they enter a school for the first time.

In conclusion, the professional training of the designer should focus on achieving the planetary quality of life and assign due importance to subjects focused on the teaching of the critical environmental situation we live in and be able to address it from the tools of the discipline, redirecting the design towards a comprehensive, resilient vision that manages to balance ethical, economic, technological, and environmental issues.

Throughout this doctoral research project it was possible to demonstrate the problems that exist in Mexico at the time of implementing strategies that guide design companies to meet the objectives of sustainable development from the work of the industrial designer, one of the

main reasons being an education whose focus is centered, on the one hand, on policies and solutions proposed by developed countries, where technological advances, culture, and size of their economies are advantageous compared to developing countries such as Mexico, and on the other hand, on the generalized apathy that exists in the industry and its clients, to incorporate healthy alternatives in their products.

The ISO 14006 standard is very practical when it comes to identifying areas of opportunity and the steps to follow under the ecodesign recommendations, but it is difficult to adapt it to a Mexican environment, where the industry is not as evolved as that of the First World countries, where this standard was born. We must accept the reality in which Mexican companies live, where many of them work with reduced budgets in the race to be competitive by offering the cheapest price, at the expense of their own growth and development. This forces companies to look for another way to become responsible with the planet and the industrial designer, with proper training, can help to achieve an efficient change in the right direction through small corrective steps, starting with environmental awareness from the companies and their workers.

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