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The application of ergonomic knowledge by undergraduate product design students: FAULisbon as a case study

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Abstract

In a period of significant change when contemporary society has demonstrated to be more conscious about the principle of accessibility, being no longer focused on accommodating people with disabilities, the current challenge involves the enhancement of inclusive design development. Design education and training has a primary role on the formation of this new mentality, providing the adequate professional skills and instilling in students the knowledge about human limitations and capacities for product design project support. So this paper, as part of a PhD research focused on product design curricula adequacy to business challenges, aims to underline the importance of teaching ergonomics to designers. It is the second part of a specific study about the presence of human factors and ergonomics (HFE) contents in the academic curricula of industrial/product design in Portugal. Using FAULisbon as a case study of a Portuguese institution, we examined the current varying HFE knowledge of undergraduate students in Design in a twofold perspective: the one of the students themselves and the one resulting from the examination of their project solutions. The results underline the relevance of three aspects: a) the HFE principles should be earlier transmitted in the education process; b) the contact and learning of tools and methods of HFE shouldn't be taught and practiced in an isolated way, instead they should be articulated with the design studio course; and c) this approach should be more practical than theoretical. This way, students could be more conscious about inclusivity and usability of products and spaces, with the focus on a user centered approach. In the future, this will allow them to respond with more social sustainable projects, increasing the chances of being more prepared and adjusted to the market and its demands.

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1. Introduction

During the last years, humanity has shown to be more aware to inclusivity and usability of products and spaces [1]. According to Paul Hawken et al. [2], this awareness is related to the new industrial system model. It is based on a mindset transition to social and ecological restoration which seeks the economic prosperity. It set of new values includes, among other things, the human welfare [2]. Thus, the current challenge is to optimize human well-being and overall system performance [3], through the principles of accessibility [4, 5].

Education and training has a primary role to provide and instill in students the application of knowledge about human limitations and capacities in the fluid project practice [6]. According to Zapata [7], new ways to design and produce, through an inclusive and sustainable design development, can be facilitated by the establishment of a methodological relationship between ergonomics and design.

The early incorporation of ergonomics theory, principles, data and methods [3], in all phases of design project [8], can have clear impacts on the quality of the proposed design solutions, adding value to the final product [5, 9, 10]. It could prevent the need of making corrections in the project afterwards, in order to adapt it to the user [7, 8].

That led to the increase of the ergonomics' importance in design area, being integrated in design education curricula. However, there is still a gap between design teaching-learning process and other subjects that correspond to the factors to be considered in the design process, namely HFE [11]. Both subjects should work together and in an integrated manner from the beginning of the project. One can complement each other through their common interests, objectives and procedures, focusing in the comfort, usability, efficiency and safety [12, 13].

So, considering this, Van der Linden [6] works in order to reduce the mismatch between the two areas and to facilitate the consciousness about its aims, limitations and advantages. He proposed "a new conception for the teaching of ergonomics for the design, that it unfolds in four points: i) elaboration of the teaching program tailored to the needs of the course; ii) adjusting the language used in teaching ergonomics; iii) incorporation of principles of design to the teaching of ergonomics; and iv) integrating linguistics analysis and design analysis to ergonomics analysis".

Van der Linden [6] believes that the first step to motivate students is to adapt the curricula of the course to their needs, through a prevision of constrains and concerns of the main planning issues that students will face in their academic career. Furthermore [14] emphasizes the absolute need to consider HFE in design education.

This also leads to fundamental questions on which we must engage to understand: What design students think about what is being taught and learned in terms of ergonomics? Are they aware to the relevance of HFE during the design development process? How is this reflected in their own projects?

2. Theoretical Framework

This paper is part of a specific study about the presence of human factors and ergonomics contents in Portuguese Design Higher Education System. It stems from another paper [15] which aimed to identify the given importance of teaching HFE in the development of design projects, to keep up the consciousness about inclusivity and usability of products and spaces. That paper presented data that was gathered and interpreted regarding the specific area of industrial/product design of both undergraduate and master curricula. The analysis of that data showed that the contact and learning of tools and methods of HFE that students had occurred late in the formation process the contents were mostly displayed as theoretical and isolated issues, and rarely linked with the design studio course [15]. In methodological terms, this current paper presents the empirical part of the research. It is focused on the undergraduation curricula and aims to underline that actually it exists a perceived mismatch between courses that have visible consequences.

2.1. The case study

The Faculty of Architecture from University of Lisbon (FAULisbon) is one of the 22 from the 29 the Portuguese institutions of higher education which offer HFE courses in its undergraduation curricula [15].

This institution was chosen as the case study because is where the authors work, making simple the contact with teaching-learning process and its results.

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