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Digital Portfolio as a communication tool in product design

El portafolio digital como herramienta de comunicación en el diseño de producto

Abstract

With the development of digital technologies, there is a growing trend towards digital portfolios rather than analogue ones. A digital portfolio is a tool that demonstrates the technical and creative skills acquired by the student during his academic career. This article results from the analysis of a set of digital portfolios created by students of the degree in Product Design and Technology with no previous knowledge in communication design. The digital portfolios gathered a selection of work done during the course, organized in six pages answering to a statement proposed by the teachers of the curricular unit. The analysis criteria were in line with the contents taught in the theoretical part of the discipline and focused on some principles of communication design such as the choice of typography, typographic grid and visual hierarchy. The results show that, although there are many advantages in this change, the immateriality of the digital portfolio requires a greater abstraction and mastery in application of the principles of communication design.

Resumen

Con el desarrollo de las tecnologías digitales, cada vez se tiende más a los portafolios digitales en lugar de los analógicos. Un portafolio digital es una herramienta que demuestra las habilidades técnicas y creativas adquiridas por el estudiante durante su carrera académica. Este artículo es el resultado del análisis de un conjunto de portafolios digitales creados por estudiantes del grado en Diseño y Tecnología de Productos sin conocimientos previos en diseño de comunicación. Los portafolios digitales recogían una selección de trabajos realizados durante el curso, organizados en seis páginas que respondían a un enunciado propuesto por los profesores de la unidad curricular. Los criterios de análisis se ajustaron a los contenidos impartidos en la parte teórica de la disciplina y se centraron en algunos principios del diseño de la comunicación como la elección de la tipografía, la retícula tipográfica y la jerarquía visual. Los resultados muestran que, aunque hay muchas ventajas en este cambio, la inmaterialidad de la cartera digital requiere una mayor abstracción y dominio en la aplicación de los principios del diseño de la comunicación.

Keywords

Digital portfolio; communication design; product design; higher education in design

Palabras clave

Portafolio digital; diseño de comunicación; diseño del producto; educación superior en diseño

1. Introduction

The portfolio, in addition to a set of selected works developed over a certain period, is essentially a communication tool that not only allows evidence of the creative capacity and technical skills acquired by the student during his academic career but is also an essential part of a designer's identity. It not only documents a past journey but also intends to build a specific future, in the sense that each one demonstrates in this object what he or she aspires to be.

The preparation of a portfolio implies selecting, systematising and organising the most representative works in an individual and identity support, which, besides the purpose of acquiring communication skills, leads the student to self-reflection on his/her evolutionary and learning process. Just as there is no single way of designing, there is also no right way to build a portfolio. There is abundant advice and different solutions found either in books or in articles on the internet to make the "perfect" portfolio, however, it is difficult for a student to move away from the average and build something innovative (Pibernik, Dolic & Kanizaj, 2014). However, there are important design principles that when followed can be decisive in achieving a better constructed object (Barrett et al., 2012).

Digital technologies development increased a growing trend towards digital portfolios to the detriment of analogue portfolios. Baron (2009) states that "A digital portfolio has become the industry standard." The trend is not exactly recent, Eisenman (2006) mentions that portfolios are made in a variety of new formats such as websites, animations, on cd, in pdf, i.e. essentially digital formats, but also in small authored editions. Currently, with the development of digital technologies, this trend is increasingly affirmed, leaving the analogue formats in the background, or for specific cases (illustrators or book designers, for example). Clazie (2010) questions this trend by presenting some benefits of this change, which we also try to perceive and present here with this analysis.

For this article, we have analysed a set of digital portfolios of the 3rd year students of the degree in Product Design and Technology (PDT) developed in the curricular unit (cu) of Communication Techniques, of which the authors are teachers. As the portfolios are an academic project, which is one of the assessment components of the course, and a response to a request from the teachers, they had the restriction of being made using two specific software programs — one of vector drawing and the other of image processing —, which implied previous learning on the part of the students. This work was always discussed with the teachers and presented during the curricular unit teaching period. Although this is a degree in product design, with a strong technical component, it is important that students refine their visual sensibility in order to build and communicate effectively the projects they develop through their individual portfolios. It is believed that the inclusion of more graphic and communicational works in a product design course, such as the digital portfolio, allows students, in general, to communicate their technical and creative skills, to systematize the work developed and, in a retrospective way, to critically reflect on their academic career in order to improve skills, attitudes and knowledge.

2. Methodology

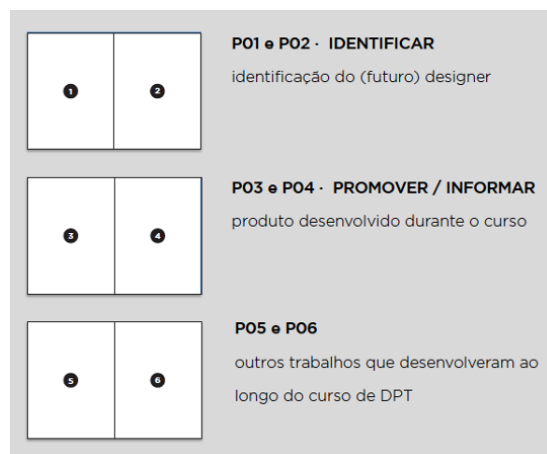
The portfolios analysed in this article were developed in the CU of Communication Techniques of the 3rd year of the PDT degree, of the School of Design, Management and Production Technologies Northern Aveiro (ESAN) of the University of Aveiro, since the academic year 2016/2017 and is one of its assessment elements. This curricular unit is lectured since the academic year 2007/2008 and since then it is proposed to students the construction of their portfolio with the representation of their most significant work developed throughout the course. In the last years of teaching the course, more specifically from the academic year 2016/2017, it was felt the need to migrate from a traditional analogue support, i.e., the portfolios were conceived in a more manual way and printed or even drawn, to the digital support.

As part of a degree course in product design, the curricular unit of Communication Techniques aims for the student to have an initial contact with the discipline of communication design and visual representation techniques and to understand its importance and added value in the product development process. The development of theoretical, practical and technical skills necessary for the communication of the project is also part of the objectives of the course. With the proposal of developing a personal digital portfolio as part of the assessment of this course, it is intended to meet the other learning objectives, namely the ability to apply visual communication and representation techniques, to understand the graphic language and its elements and the ability to apply graphic elements in different media.

During a semester, in the several academic years in which this analysis is focused, the students developed their individual portfolio answering to a statement proposed by the teachers (see image 1). To carry out this work, and as an integral part of the course, two software programs were taught, one of vectorial drawing and the other of image processing. This work, not being the only element of the CU evaluation, was developed in eight weeks of the fifteen that compose the semester.

The statement proposes the organisation of the portfolio into six distinct pages leaving the choice of page format to the student. Each of the six pages should contain the following information: pages one and two should include the student's self-portrait, his/her identification and a brief biography and/or curriculum vitae; pages three and four should include a product developed during the course and an advertisement, its promotion, and may include it, for example, in a context of use accompanied by its technical data sheet with all its details and specifications; pages five and six should include other works developed during the PDT degree course that were equally revealing of the student's competences/capacities and interesting for a potential employer. As a work methodology, it was suggested that students first collect and select all the information they considered pertinent to their academic career to start organizing their digital portfolio. All the decisions inherent to this selection and organization should be discussed, weekly, with the teachers in class. They were also recommended to respect the order of the distribution of the contents proposed in the statement and to start their work exactly in that sequence. In other words, starting by creating the self-portrait, then creating a grid to distribute the information, and then organising the biography and/or cv trying to respect and replicate it on the remaining pages. The students were also asked to do the page layout of this work and everything involving the organisation of the pages in the vector drawing software taught and the self-portrait and everything relating to montages or image treatment in the software taught for this purpose.

Image 1: Portfolio structure proposed to students



Source: Autoras ©

For the analysis proposed in this article, were collected 122 portfolios prepared by the different undergraduate students who attended the curricular unit between the academic years 2016 and 2020, of five consecutive years. From this collection only the 112 portfolios that obtained a positive assessment of the curricular unit delivered in the normal period were taken into account.

Of the 112 portfolios with positive evaluation, it was decided to reduce the sample and select for this analysis only the three portfolios from each year with the highest final rating, thus reducing the total to fifteen. On a scale of 0 to 20, the average score of the selected portfolios was 18.

A set of assessment criteria was defined based on principles of communication design taught in the theoretical-practical component of the course, in order to analyse the portfolios regarding their graphic and communicational effectiveness. For each concept of communication design defined for this purpose — typography, typographic grid, visual hierarchy and graphic consistency — rubrics with four qualitative indicators of the student's level of performance were created: insufficient, average, good and excellent.

2.1. Evaluated design concepts

The parameters analysed within the four assessment criteria are now described and the respective headings are presented as instruments of analysis.

2.1.1. Typography

"Typography is more than just choosing a font; it is about making your information legible and readable while still keeping an aesthetic layout" (Barrett et al., 2012: 35).

Regarding typography, it is understood that it is essential for the communication and interpretation of the message, being a decisive element for the effectiveness of communication. Thus, within this area of design, legibility, the font selected, the hierarchy of the text and compliance with the main typographic rules were assessed.

Legibility is a factor, sometimes fundamental, to the perception of the message. It can be defined as the relative ease with which a text can be read (Heller, 2016) or, as Eric Gill (2003 :71) states " legibility, in practice, is simply what we are used to". A good choice of font, and its appropriate use, can be determinant for the legibility of a text. However, it is not the only condition, legibility can also be affected by kerning, leading and alignment of the text. After being given content about this issue, students are encouraged to experiment with different fonts but are advised to focus on the classic, time-tested fonts and to select the ones they consider most suitable for the graphic language of their work.

The font selection was also one of the evaluated topics being, however, directly related to legibility. The choice and combination of fonts appropriate to the work makethe recipient focus his or her attention on the content and not be distracted by the font design. However, combining different fonts is not easy to achieve, especially for a beginner in the discipline, and requires aesthetic sense and practice in page layout. As Bringhurst (2005: 105) states, "Typographic purists like to see each type family used in the technology for which it was designed", however, this is not always achieved. Although this premise is not entirely "taken literally" it was encouraged that there was a concern to choose typefaces that would work well in a digital support. However, the difficulty in combining different fonts, resulting from a lack of typography knowledge and little practice may condition the choice.

Regarding the hierarchy of the text, it is fundamental to understand it as a system of organisation of the content. This organisation, which the students had to think about in their portfolio, is in essence about assigning degrees of importance to the different elements of the text so that the eye of the person reading is directed towards that which is most important in the order defined. The elements that allow you to prioritise a text can be divided into spatial - which are punctuation (paragraphs, indentation, subscript, interlining, kerning, etc) and position on the page - and graphic - size (title, subtitle, footer), font (serif or non-serif), variations of the family (bold, italic, etc), added elements (shadows, underlining, strikethrough, etc) and colour. It is then fundamental to define criteria of importance of the content to be exposed in the portfolio pages to establish the hierarchy at text level. This hierarchy, although it can be defined in several ways, should remain consistent throughout the portfolio.

Finally, within the typography rubric, we also assessed the compliance with the main typographic rules, such as the use of appropriate kerning, comfortable leading for the font, line size and coherent alignments. These typographic rules are discussed in the theoretical-practical classes, in an expository way complemented with examples, but also in the weekly practical classes in the form of comments and constructive criticism when monitoring the portfolios.

Table 1: Typographic Assessment Rubric

	Poor	Average	Good	Excellent
	1	2	3	4
Legibility	Illegible font type	Font has reasonable legibility	Font has good legibility	Font has a perfect legibility
Font selection	Fonts don't match and are not suitable for the type of work	Fonts are suitable but do not match	Fonts match and are suitable for the work	Fonts match and are consistent with the graphic language of the work
Text hierarchy	No hierarchy in the text	Establishes a text hierarchy in some parts	Establishes hierarchy adequately in most of the text	Establishes hierarchy correctly throughout the text
Typography rules	Does not comply with any typographical rule	Complies with basic typography rules	Complies with most of the typographical rules	Fulfills all typographical rules beyond reproach

2.1.2. Grid system

The grid is an invisible structure that defines a system of distribution of the elements on a page or area. It serves to divide and control the space where information is to be inserted and should always be appropriate to what is to be communicated. It helps to make the space into a composition, making it simpler to organise with clarity, consistency and supported by continuity, for example when you are paging a long document. They also contribute to visual harmony and aesthetically interconnect various elements of the composition (Evans, Sherin & Lee, 2013).

The geometry of the grid will allow within a rigid structure to achieve a variety of possibilities for page configurations that, although visually different, have the same matrix. To build a grid you can use several structuring elements such as guides, columns, margins, text areas, image areas and white space areas. When you start designing a layout or building the grid, you need to think about several factors, namely the format; the text area and margins; the width, length and spacing between columns, if any; the font, its size and the number of characters in a column; the pagination; and the colour.

In the selected portfolios, the construction of the pagination grid was analysed, depending on the content and its purpose, i.e. how it was conveyed.

The use of the grid was also evaluated, that is, after it was constructed, how it was used to organise and communicate information.

Table 2: Grid System Assessment Rubric

	Poor	Average	Good	Excellent
	1	2	3	4
Grid Layout	The student didn't make any grid	The student make a basic grid system	The student make a suitable system grid	The student make a perfect system grid
Content organization	The student didn't use the grid system	The student used the grid system, but didn't use it to organise the content on the pages	The student used the grid correctly on more than half of the pages	The student took advantage of the grid system and its flexibility allowed

2.1.3. Visual hierarchy

Visual hierarchy can be defined as the sequence by which the human eye understands what it sees and is one of the most important principles for achieving effective communication. In a text and image composition, a good visual hierarchy will allow us to highlight what needs to be highlighted. In this sense, with properly structured and organised information, even if in a simple way, it is possible to communicate the intended message, that is, the communication of the message is more effective. To build a visual hierarchy it is necessary to first define what the main information is and its distribution on the page. Regarding the study of the portfolios regarding their visual hierarchy, some principles were taken into consideration, such as size, alignment, proximity, density and white spaces.

Regarding dimension, it is considered that the larger objects attract more attention, so they should be the most important in the composition. The different dimensions of the elements present on the pages guide the reading and help to direct the reading orientation.

Alignment establishes the order between elements and organises them, allowing visual connections to be created. The construction of the grid creates invisible lines of force that provide alignment. A good alignment usually goes unnoticed by the reader, only being noticed when something is not coherent. Proximity is related to the distribution of elements in space and helps to create a relationship between what is similar or related to each other, such as text and images. It is the easiest and quickest way to associate similar content. The elements do not have to be grouped, but they must be visually linked more effectively, that is, it does not have to be only in a spatial manner, it can be through colours, fonts, shapes, sizes, etc.

Regarding density and white spaces, it is understood that arranging several elements in the same space can make it visually "heavy" and disorganized. On the other hand, when the elements are too widely

spaced they can lose the relationship between them. By resorting to blank, white space, it becomes easier to move the eye and find the elements. By using this principle correctly, elements that are related will be more easily perceived.

Table 3: Visual Hierarchy Assessment Rubric

	Poor	Average	Good	Excellent
	1	2	3	4
Size	Composition elements have the wrong dimensions	Some of composition elements have the correct dimensions	Most of the composition elements have the correct dimension however, shows some flaws in eye orientation	The size of the elements is perfectly defined, guiding the reader's gaze correctly
Alignment	Elements are not aligned	Elements are aligned but disorganised in the composition	The elements are aligned and organised in the composition	The elements are well aligned and organised in the composition, which allows for clarity in the message.
Proximity	There is no proximity between the interrelated elements	Interrelated elements are close but disorganised	Interrelated element are close and organised	Remarkable organisation and proximity of interrelated elements.
Density/ White spaces	No visual balance between text, image and white spaces	An acceptable visual graphic balance between text, image and white spaces	Good visual graphic balance between text, image and white spaces	Perfect visual graphic balance between text, image and white spaces

2.1.4. Graphic consistency throughout the document

Graphical consistency is reflected in the way elements such as font, colours, images, white areas, hierarchy and grid are maintained and repeated consistently across the pages of the document. Consistency helps us to realise that there is an interconnection between pages of the same work and to understand it as a whole, creates a sense of structure for those who are viewing or reading the document, making it easier to read and interpret. Previously defining those essential visual elements, such as, for example, the font, the hierarchy of titles and other contents as well as their positioning in the composition, the colour palette, etc, facilitates the decisions that are necessary and are recurrent during the preparation of the remaining pages. Graphic consistency throughout the document will enable a graphic and visual identity to be found that may help, in some cases, to reveal the author's personality. The consistency is not subject to the criteria of visual graphic quality, it only concerns the inalteration of the elements and continuity throughout the portfolio, that is, in this rubric it is not intended to evaluate if graphically the portfolio has an adequate language but only if they managed to maintain coherence in all the pages of the work.

Table 4: Graphical Consistency Assessment Rubric

Poor	Average	Good	Excellent
1	2	3	4
No graphic consistency across the portfolio	Clear graphic consistency in some portfolio pages	Clear graphic consistency in most portfolio pages	Graphic consistency is explicit and clear throughout all portfolio

2.2. Analysed portfolios

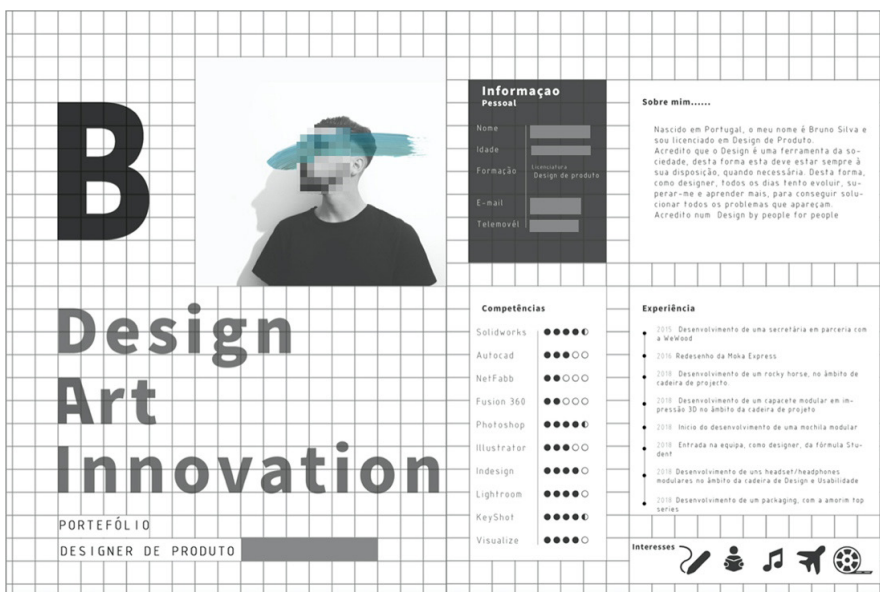
At this point, three examples of pages from the portfolios analysed are presented for each of the parts requested in the statement: Identity, Promote/Inform and Other works. We chose to present the work of 9 different students who exemplify the graphic diversity that makes up the sample of portfolios analysed.

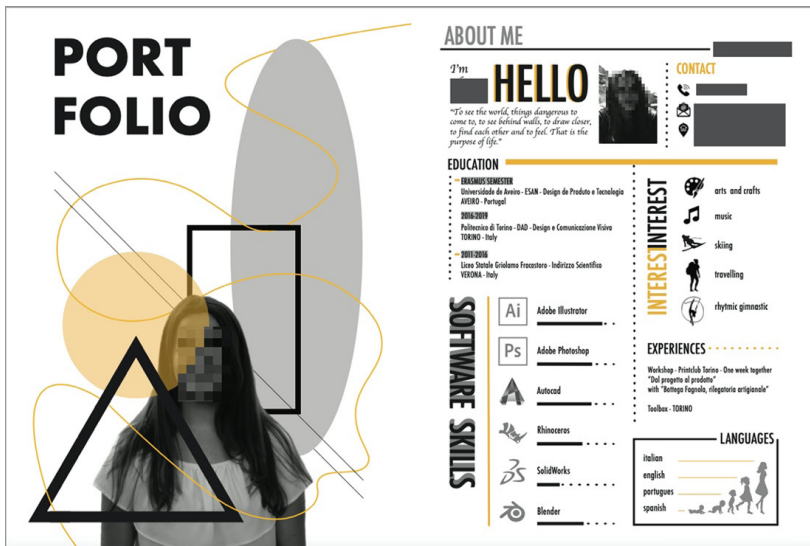
Images 2, 3 and 4 show examples of pages 1 and 2 of the portfolios, which, as can be seen in image 1 (proposed portfolio structure), the objective is Identify. In these pages are represented the self-portrait and the brief biography or cv corresponding to the identification of the (future) designer.

In the self-portrait, students are asked to communicate their profile as a (future) product designer to a potential employer. This way, they should try to elaborate a graphic composition, from a photograph of themselves, which demonstrates their skills and technical command of image editing software, as well as their more creative or more technical potentialities. The two initial pages require the student to reflect on their profile and how they want to communicate it.

Due to the freer character of the self-portrait, this is an exercise more detached from design concepts; however, the graphic options taken by the students should evidence good practices of communication design, namely in terms of maintaining coherence in the portfolio's globality.

Images 2, 3 and 4: Examples of self-portrait and biography /cv pages



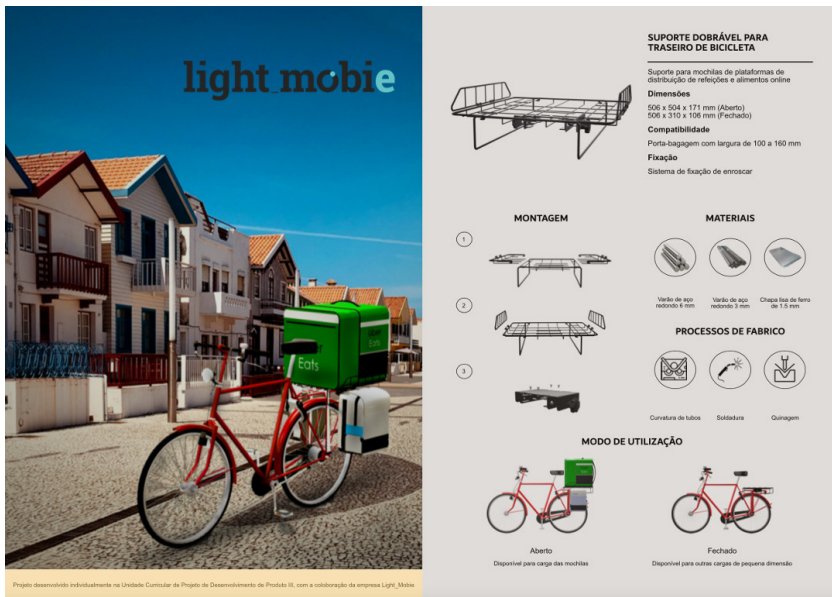


Pages 3 and 4 of the portfolios focus on a product of their choice that has been idealized and developed during the course. Normally developed during the project curricular units, the selected product must be representative of the student's academic path and the student must feel proud and satisfied with the final result. Having as a work base the chosen product, the student must conceive an advertisement with image and copy, to promote the product in Design magazines, but also a file with technical information and all the specifications and characteristics of the product. To design the advertisement the student must think of innovative and differentiating factors of the product in relation to the competition and the target audience for which it is intended. As a graphic resource, you can use photomontages of the product in the context of use (image 6) or graphic compositions that associate the product with a characteristic of the target audience reinforced by a photograph (image 5).

The elaboration of the product technical sheet has become a more complex challenge for most students, as it has more content to organize and, in this sense, it has to respect alignments, proximity, density and empty spaces to communicate in an understandable way the characteristics of the product. The amount of product-related information collected by the student, such as text, renders, photographs and technical drawings can be a determining factor in producing both a good advertisement and an appropriate datasheet.

Images 5,6 and 7: Examples of the "Promote/Inform" pages





The last two pages of the portfolio are filled with other projects developed throughout the course, in various curricular units, also representative of the student's academic path and that help to complement what he wants to demonstrate as a future designer. In the final pages, students may, exceptionally, include work done outside the scope of the course, as long as their inclusion is duly justified to the teachers. The amount of work to be placed is left to the discretion of the students, taking into account that the available space is only two pages. The students define their approach according to the amount of work or information they have at their disposal. They may put one project per page (image 8), two projects per page (image 9) or three products per page (image 10). Once again, looking at these images, the graphic diversity of the portfolios analysed is visible.



SADO eBIKE 550
ELECTRIC BIKE INSPIRED BY A PORTUGUESE CAR

A city bike inspired by one of Portugal's staples, the Sado 550, the 70s mini car. The bike's shape resembles the Sado's shape, and with its unusually small wheels features the exact same identity.

It's body is made of carbon fiber and ABS plastic for a maximum performance without compromising on its weight.

An automatic speed system was integrated in order to adapt the bike to the city life, while keeping a 80km range with a single charge.




AILEEN
CEILING LAMP WITH DIRECTIONAL CONTROLS

LIGHTING DIRECTION



A ceiling lamp with three lighting directions: direct downwards, filling ambient side illumination and upper decorative lighting each one controlled individually wirelessly.

Aileen was developed specifically for conference and meeting rooms, and its precise lighting control system is meant to adjust and optimize the room for any event.

Additionally, it has light temperature control integrated to optimize illumination throughout the day.

It's made mainly by aluminum and polycarbonate, minimizing its weight.


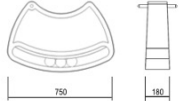


1150mm

Cavalinho de Baloço

Disciplina: Modelos e Protótipos

Objetivo: Projetar um cavalinho de baloço para crianças até aos 7anos de idade, e criar um protótipo do mesmo à escala real, utilizando todo o tipo de ferramentas, tanto manuais (fritchas, lixas, grossas, etc.) como eléctricas (plainhas, lixadeiras eléctricas, etc.).


750 180

Trabalho de Grupo com Inês Martins e Jéssica Assunção

Serrrote de Poda

Disciplina: Engenharia de Produto


Objetivo: Desenvolver e detalhar uma ferramenta manual articulada, sendo que a sua pega deve ser obrigatoriamente feita em materiais poliméricos, recorrendo a tecnologias de moldação.



100mm

Materials:

- Polipropileno (PP)
- Poliuretano (PU)
- Aço de Elevado Carbono





Relógio Despertador

Disciplina: Design e Usabilidade

Objetivo: Selecionar e analisar um produto a nível da sua funcionalidade e usabilidade, e proposta de melhoria ou uma nova solução.

Medidas: 120mm x 10mm x 5 mm





Trabalho de Grupo com Inês Martins

Carro de Cozinha

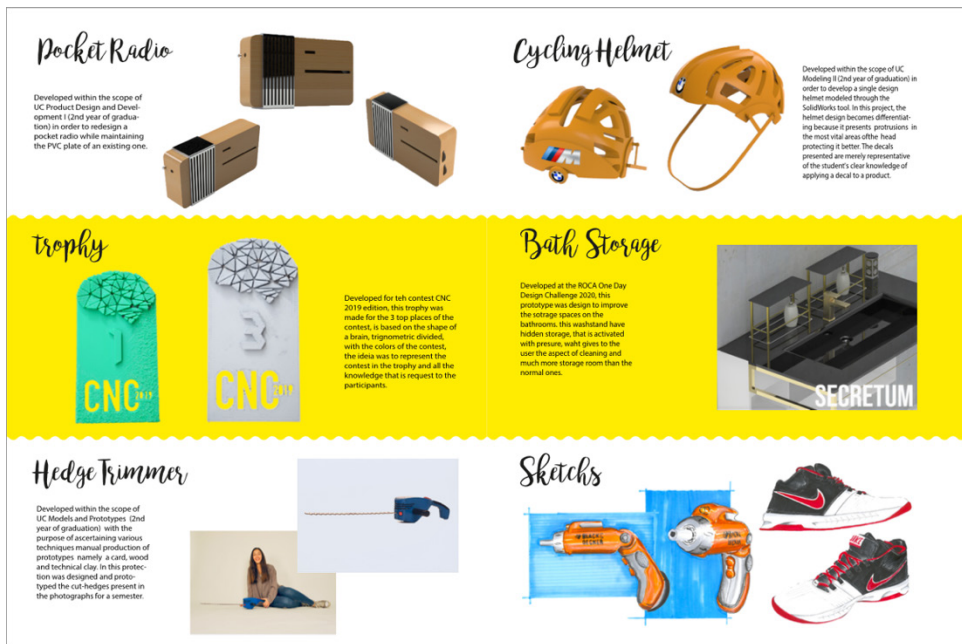
Disciplina: Engenharia de Produto

Objetivo: Desenvolver e detalhar um carro de arrumação para cozinha. O mesmo só pode ser feito em chapa ou perfil em metal e só se podem utilizar processos de soldadura, quinagem e corte.



Materials:

- Aço Laminado a Fio
- Preto
- Polipropileno (PP)



3. Results

For the analysis presented here, the 6 pages that make up each of the selected portfolios were visualised. The results presented in Table 5 systematise the global analysis of the set of individual portfolio pages regarding typographic choices, grid usage, visual hierarchy and graphic consistency throughout the document. It should be noted, again, that the sample of portfolios analysed corresponds to the three papers that obtained the highest score in the last five academic years, from 2016 to 2020.

As far as typography is concerned, the portfolios revealed a concern on the part of the students in the choice of the font, trying to comply with legibility criteria, which allowed establishing hierarchies through the text, but not always ensuring good legibility. Two of the analysed works showed difficulty in selecting fonts adequate to a digital format, as well as in combining them. This difficulty is visible in the biography/cv page presented in the portfolio in image 4. Typographical rules were not totally neglected, however only 2 in the sample of 15 students complied with them in an exemplary way.

In the portfolios of the sample, it is noticeable the existence of a grid for the organization of texts and images on the pages. Despite some imperfections in the construction of this grid, such as the lack of space between columns, the structure they designed helped to organise the content over the pages, ensuring the graphic consistency of the work. It is understood that compliance with the typographic grid has an impact on the results of graphic consistency, with most portfolios being in the two highest levels of assessment, excellent and good.

As for visual hierarchy, the results for the 4 elements analysed: element size, alignment, proximity and density / white spaces reveal ease on the part of the students in defining and establishing visual hierarchy to communicate the message clearly, with the proximity of the elements obtaining the best results.

Although the answers from the analysis of the portfolios concerning density and white spaces were good, it should be remembered that the works presented are the result of work monitored by the teachers weekly throughout the semester. The "horror" of emptiness and the unconscious need to fill all the available space is systematically discussed with the teachers, who stress the importance of white spaces in order to make the elements of the page visible.

Table 5: Results of portfolio analysis (total=15 answers)

Typography				
Poor	0	2	0	1
Average	6 (40%)	5	5	6 (40%)
Good	4	6 (40%)	4	6 (40%)
Excellent	5	2	6 (40%)	2
	Legibility	Font selection	Text hierarchy	Typography rules

Grid System		Graphic consistency	
Poor	0	0	1
Average	8 (53,3%)	1	1
Good	7	8 (53,3%)	6
Excellent	0	6	7 (46,7%)
	Layout	Content organization	

Visual Hierarchy				
Poor	0	2	0	1
Average	5	1	5	2
Good	6 (40%)	7 (46,7%)	4	7 (46,7%)
Excellent	4	5	6 (40%)	5
	Element size	Alignment	Proximity	Density / White spaces

4. Final considerations

The study reported here sought to evaluate the digital portfolios produced by the students of the degree in Product Design and Technology at ESAN. Although the results show that the digital portfolios show an acceptable application of the concepts covered in the lectures, the sample size was insufficient to conclude about the students' major difficulties in migrating from an analogue to a digital portfolio. Therefore, it is necessary to increase the number of portfolios to be analysed, and to include in the sample of a future study portfolios with more diversified final grades. Also as a future work, it is necessary to define two work groups, one of them being a control group that would answer the same questionnaire for the portfolio, but would have as an imposition the realization of an analogical portfolio. In this way, the analogue portfolios resulting from the control group could be compared using the same design principles with the digital portfolios.

However, there are several advantages to using a digital support, namely regarding the economy of means that, since there is no waste of resources, there is less fear of making mistakes and it is easier to correct when this happens. Other advantages found in the transition to digital are the possibility of using different colours; an easy and continuous updating, not becoming obsolete so quickly; the number of pages can be unlimited; an easier dissemination and diffusion and also the possibility of more interactivity. Regarding this last point, no student took advantage of the interactivity that a digital format allows, in this specific case the pdf.

It is understood that the immateriality of the digital portfolio requires greater abstraction and mastery in the application of the principles of communication design, which was not always achieved by these students. In particular, regarding typography, the choice and combination of different fonts requires knowledge, aesthetic sense and practice in pagination, which does not happen with the sample of this study, noting that this difficulty led to the choice of a single typographic family that may affect the originality of the final work. It is therefore considered important to reinforce the teaching of contents related to typography in the theoretical and practical component of the communication techniques unit.

As for the analysis instrument used - the rubrics that were presented in this document -, it allowed to evaluate how the students managed to apply in a practical way the theoretical concepts taught in the curricular unit, and it was concluded that, although perceiving the need to reinforce the design principles analyzed here, by applying in the portfolio the guidelines of the theoretical-practical component, the students managed to build a better communication tool. It is also highlighted as a positive factor of the work done in the CU the fact that, after the end of the semester, many students have sought the teachers to improve their individual digital portfolio, as for the contents and its organization, and use it to deliver to the companies where they went to intern, fulfilling, thus, in our understanding, the real purpose of this work.

5. Bibliographical references

- [1] Baron, C. L. (2009). *Designing a Digital Portfolio*. 2nd ed. Berkeley: New Riders.
- [2] Barrett, C., Broerman, A., Carrillo, E., Depenthal, M., Doyle, K., Dunphy, A., & Woniger, J. (2012). *Hire me?! The portfolio handbook. A guide to creating design portfolio*.
- [3] Bringhurst, R. (2005). *Elementos do estilo tipográfico*. Editora Cosac Naify.
- [4] Clazie, I. (2010). *Creating Your Digital Design Portfolio: A Practical Guide for Showcasing Your Work Online*. RotoVision.
- [5] Eisenman, S. (2006). *Building design portfolios: innovative concepts for presenting your work*. Gloucester, Massachusetts: Rockport Publishers.
- [6] Evans, P., Sherin, A., & Lee, I. (2013). *The graphic design reference & specification book: Everything graphic designers need to know every day*. Beverly: Rockport Publishers.
- [7] Gill, E. (2003). *Ensaio sobre tipografia*. Coimbra: Almedina.
- [8] Heller, S. (2016). *The graphic design idea book*. London: Laurence King Publishing.
- [9] Pibernik, J., Dolic, J., & Kanizaj, B. (2014). What is creativity in web portfolio design? *Digital Creativity*, 25(2), 126-139.

6. Notes

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7. Acknowledgement

This work is financed by national funds through the FCT – Fundação para a Ciência e a Tecnologia, I.P., under the scope of the project UIDB/04057/2020