

# THE VALUE OF DESIGN RESEARCH

## AN EXPERIENCE REPORT ON TEACHING DESIGN

11TH EUROPEAN ACADEMY OF  
DESIGN CONFERENCE

APRIL 22-24 2015

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### ABSTRACT

*This paper presents part of the results of a post-doctoral research. It is born from the experience gained in the research work developed during the Post-Phd internship supported by the National Council of Scientific and Technological Development (CNPq), an agency of Brazil's Ministry of Science, Technology and Innovation (MCTI, which resulted in a teaching material called "Design, Education and Technology". This material received the "Aid for Publishing" (APQ 3) - Faperj. It is constituted by two complementary parts that proposed the experiencing of languages as addressed in the printed book, and in the e-book. The characteristics brought by contemporaneous digital technologies create a "new way to conceive and produce design". This study aims to create solutions to reduce this problem and to provide interdisciplinary theoretical knowledge supporting discussions about the digital technologies applied to Design learning. This paper focuses on the use of a digital environment by reporting an experiment using the e-book "Design, Education and Technology" as a teaching tool in undergraduate courses in design, results and notes on issues involving interactivity and user experience. The methodology has a qualitative bias, developed along the lines of an exploratory research in the form of a case study, lectures, and workshops, a quiz and analysis of results were applied.*

*Keywords: Design, Teaching and Learning, Technology, E-book, Interdisciplinary*

### 1 INTRODUCTION

This paper presents part of the results of a post-doctoral research project which is called "Hypermedia Design involved with the User Experience" and is included in the research project "Design beyond design: contemporary and transdisciplinarity" integrated into the group called "Contemporary Design: systems, objects and culture" connected with the Directory of Research Groups in the Brazilian National Council of Scientific and Technological Development (CNPq). Coordinated by Professor Phd. Mônica Moura from Paulista State University, the focus of the developed studies and surveys, related to this group. It addresses the issues of design within its language, processes and methodologies, as well as the interdisciplinary, transdisciplinary and experimental aspects present in the experimental contexts of contemporary practice, in the theoretical-reflective and teaching and learning universes. These contexts consider various issues involving the interaction and the user experience.

This study, as mentioned by Portugal (2014), is born from her own experience gained in the research work developed during the Post-Phd internship supported by the National Council of Scientific and Technological Development (CNPq), an

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agency of Brazil's Ministry of Science, Technology and Innovation (MCTI). (2010-2012), which resulted in a teaching material called "Design, Education and Technology". It received the "Aid for Publishing" (APQ 3) – 2012.2 – Faperj" and is constituted by two complementary parts which proposed the experiencing of languages as approached from the printed book, and from the e-book (<http://www.design-educacao-tecnologia.com/>).

Contemporary digital technologies create new ways of conceiving, designing and it can help in the process of teaching and learning on the field of design, making fundamental studies and research related to the subject-user, their processes of interaction and experience in hypermedia systems and digital in the context of interdisciplinarity.

To Moura (2003), the hypermedia design requires that the designer masters not only the ratio image and text, but also the grammar arising from other languages, the sound and their relationships, the organization and structuring of information, interactivity, mobility and navigation and the elements for the design and composition of the interface. The interaction made possible by digital technologies has expanded four qualities of humans: curiosity, creativity, cooperation and the experience of playfulness which contribute to the creative thinking.

For Gamba Jr. (2013), the relationship presented by the author on relations between Design and Learning, makes this study almost a meta language of contemporaneous knowledge, where new media, informational and cognitive models propose an innovative learning perspective.

The goal of this paper is to create solutions in order to provide interdisciplinary theoretical knowledge to support discussions about digital technologies applied to teaching design focusing on the user experience aiming at the educational development, and technological innovation with the proposal of assisting the spreading and deepening of this area of knowledge.

The methodology adopted has a qualitative approach, exploratory, case study, application of lectures, workshops and dynamic for observation, a questionnaire and analysis of results.

## **2 REPORT OF THE EXPERIENCE USING THE E-BOOK**

This study presents the investigation of the e-book Design, Education and Technology through the use of everyday technologies as a mean to verify the impact on the academic performance of students conducted in Design classes at the Paulista State University UNESP/Bauru.

The use of the digital environment during the teaching and formation in design, according to the experience of Portugal (2014), provides design students with a hypermedia tool aimed to collaborate in the teaching-learning process. The contents part of the e-book Design, Education and Technology are presented in a non-linear way, bringing theoretical and aesthetic reflections about the role of design in the development of hypermedia environments. Several pictures and bibliographic references support the texts present in the book. The item about information that complements the main texts is worth to mention. It offers a selection of books, sites, games, videos and apps that stimulate the book user to go deeper in each particular theme.

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The methodology adopted, in order to analyze the use of the environment, was the one of an exploratory research by means of a workshop divided in two stages applied in two classes from Project III discipline (graphic and editorial projects) of basic design during the third period of the undergraduate course in Design at the Architecture, Arts and Communication Faculty, together with the Graduate program in Design – Design Department of the Paulista State University UNESP/Bauru. The objective of the workshop was to raise the awareness of students and to discuss the importance of information design and interaction design as well as hypermedia design in creating projects of digital magazines. The stages of the workshop are presented below:

In order to develop this first stage, a research was performed in a dynamic presented during a lecture where the main theme was the construction of knowledge made possible by digital technologies and its possibilities to enhance the teaching and learning process.

In the referred dynamic, students from Project III discipline (graphic and editorial projects) were divided in three groups comprised of eight students and, for each one of them, the role of representing one of the fields; Design, Education or Technology was designated. Three strings of different colors were given to the students and each student of each group, by means of the strings, represented an area of expertise within the fields mentioned above and they had to interrelate the fields with the string forming knots as a knowledge network – metaphorically speaking, in the same way that contents are made available on the internet. This dynamic has served to mobilize them regarding the digital book contents. And then a talk about the e-book Design, Education and Technology was presented.



*Figure 1 – Source: Project III discipline, Undergraduate course of design, UNESP/Bauru, April/2004. Photos of Cristina Portugal and Mônica Moura.*

In this lecture and in the dynamics the question of convergences of contemporary languages made possible by hypermedia environments to built knowledge was considered.

At the end of the lecture a video was presented: “SILK PAVILION” (<http://vimeo.com/67177328>) from the Mediated Matter Group. The Silk Pavilion explores the relationship between digital and biological fabrication. However, the idea of showing the video during the lecture was to bring a discussion about the construction of knowledge networks made possible by the Internet. As a metaphor, each silkworm represents an individual who builds its data network and, when connected to other individuals, creates a huge information network that undergoes transformation in several and different knowledge represented by the silkworms when transforming themselves. The idea was to raise students’

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awareness about the importance of each one in the process of generating information.

In the second phase of the workshop a mini-course was applied to the same students that participated in the first mentioned dynamic from Project III discipline (graphic and editorial projects) of the undergraduate course in graphic design from UNESP/Bauru. The mini-course was given to ten students and a Master in design that was interested in taking part on it (these students have participated in the previously reported dynamic). The objectives of the discipline were the following ones :

- To develop graphic projects of periodical editorial products, both printed and digital;
- To manipulate concepts of design in periodically printed and digital publications;
- To study and to plan the various production stages of projects.

And it has as specific objectives:

- To create, to develop and to produce editorial graphic products – printed and digital periodicals;
- To elaborate, test and apply design concepts in the proposed editorial graphic products;
- To apply the production stages of the projects.

By means of the mini-course using the e-book, it was intended to reach the objectives of the discipline mentioned above and to provide knowledge about information design, interaction design and hypermedia design for the aesthetical and theoretical foundations on graphics and editorial projects for developing the digital magazine.

The content of the e-book *Design, Education and Technology* contemplates themes such as: color, typography, image, accessibility, usability, cognition, interaction, materiality, process, technology, and reception. Those are some of the questions necessarily involved in the interface between human and physical reality. For Gamba Jr (2013), this is where the challenge and value of design are founded. The author Cristina Portugal faces this complexity with the systematization needed for keeping the projectual method. Today it is possible to really elaborate a knowledge that allows to coincide, overlap, or to put in dialogue knowledge areas normally set apart by culture, but generously amalgamated by design.

In the first part of the mini-course, students should navigate the e-book *Design, Education and Technology* focusing in learning about information design, interaction design and hypermedia design according to the content available on the e-book as shown in the figures of the screens of each module (Figure 2).

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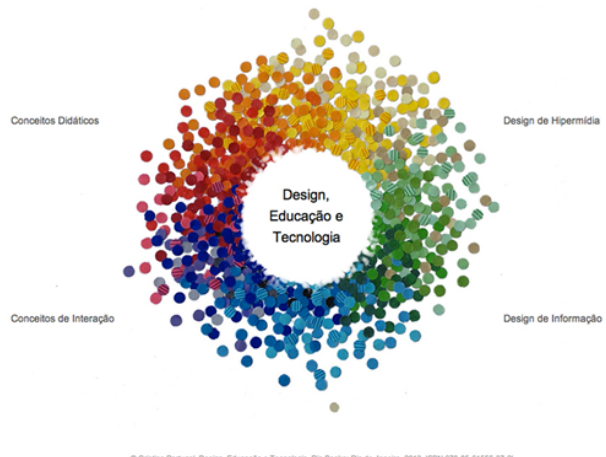
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Design da Informação

Arquitetura da informação

Conceito Mapa conceitual Mapa de navegação

### Mapa conceitual

Um mapa conceitual representa os principais conceitos e relacionamentos dentro de um determinado contexto. Ou seja, é uma ferramenta utilizada para organizar e representar o conteúdo que se quer disponibilizar. A elaboração de um mapa conceitual pode facilitar a criação da Arquitetura da Informação de um ambiente de hipermídia. Para tanto, o mapa conceitual deve definir um vocabulário comum de referência para o produto que será utilizado durante todo o desenvolvimento a fim de promover o entendimento compartilhado.

Dicas para mapas conceituais eficazes [3]:

- A linguagem utilizada em um mapa conceitual não deve ser ambígua, e ser facilmente compreendida dentro do seu contexto;
- Os mapas devem ser desenhados desde o início da análise da pesquisa para o desenvolvimento do projeto, e redesenhados com frequência. Com cada adição ou refinamento há a oportunidade de descobrir novas relações entre os conceitos;

Design de Interação

Usabilidade

Conceito Projeto centrado no ser humano Usabilidade e ergonomia

### Conceito

A Organização Internacional para Normalização (ISO) é uma federação mundial composta de organizações nacionais de normalização. De acordo com a ISO 9241-11 [11], usabilidade se refere à capacidade de um produto ser usado por usuários específicos para atingir objetivos específicos com eficácia, eficiência e satisfação, em um contexto específico de uso.

A eficácia refere-se à precisão e completude com que usuários específicos podem alcançar objetivos específicos em ambientes particulares. A eficiência está de acordo com os recursos gastos em relação à exatidão e integridade das metas alcançadas.

Conforme a ISO 13407 [12], a usabilidade, como disciplina já consolidada, foi apresentada pelas empresas de tecnologia como qualidade de grande importância ou mesmo diferencial competitivo em produtos digitais interativos durante as duas décadas anteriores.

No campo da usabilidade, a experiência é geralmente definida em termos de facilidade de uso. No entanto, a experiência engloba mais do que apenas função e fluxo, mas o entendimento compilado através de todos os sentidos.

Figure 2 – E-Book Design, Education and Technology - screens (Portugal, 2013)

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After navigating the e-book, students answered an online questionnaire that enabled both analyzing the use of the e- book and the questionnaire itself, that has questions related with the construction of hypermedia environments, which facilitated the understanding of the topics needed for the learning of design and its various relationships with technology in order to understand the contents needed for the analysis of digital magazines, objective of the mini-course (Figure 3).



*Figure 3 - Source: Discipline of Project III, Undergraduate course in Design, UNESP/Bauru, April 2014. Photos of Cristina Portugal and Mônica Moura.*

Assuming that the e-book available on the site: [www.design-educacao-tecnologia.com](http://www.design-educacao-tecnologia.com) has as its proposal to disseminate theoretical and aesthetic fundamentals of design and their relations with technologies and the learning and teaching process and, aiming to assess the users' experience, students were asked to answer the questions in the questionnaire mentioned above. Here are some fragments of the stories drawn from questionnaires completed by the students.

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### **2.1 FRAGMENTS OF THE SURVEY**

Report what you have learned with this e-book.

— *"The learning acquired brought a better understanding of the issues addressed. The individual learning enabling the user to create its own time of reading and assimilation, being able to restart and access it as many times as wanted, that content was a major contribution. Through this digital book it is possible to understand the role of the designer on the composition and development of materials involving the users' experience and how the designers add value in the learning when they work the visual stimuli, organize information and focus on the final subject when one intends to conceive an interface".*

How do you consider the importance of this e-book for learning, for professional practice or for the teaching practice in design?

— *"This book is considered to be an enriching experience which should be disseminated in the design field and between other disciplines because it stimulates the learning concepts about design since it uses very well the knowledge provided by the Design area. The importance of this book is in line with the enhancement of learning focusing on the user, on its human side and, because of that, its contribution for future projects involving both didactics in design and professional practice is essential"*

Analyzing the digital book as a whole, describe how was your interaction experience.

— *"The interaction experience was quite interesting since the digital book had many resources as teaching tools: in verbal and non-verbal text modes, videos and links, giving the student a wide possibility of information in a single book".*

In a first contact with the book through the site, how do you perceive the main contents approached by the digital book? And how do you perceive the relationship between the covered contents?

— *"The contents about design were well covered, through graphic accessories (for example, the use of border and edge of the same color) allowing to unify each treated subject. In addition, each segment covered is well presented through explanatory texts, along with images and videos that facilitate the users' understanding. Also, additional information such as bibliography and reference materials (printed and virtual) are presented, adding value to the content".*

After completing the quiz, the second part of the mini-course has began – students had previously selected two examples of digital magazines and had to analyze them regarding the content available on the digital book about hypermedia design, information design and interaction design and post the analysis of the selected magazine in the Facebook page of the class for further discussions and evaluations of the work performed.

Students made their works and comments available in the Facebook page. Below is displayed one of the five examples of results obtained with this activity.

### 2.2 THE ANALYSIS OF DIGITAL MAGAZINE 3D TUTORIAL MAGAZINE



Figure 4 -Example of a Facebook page with the analysis undertaken by the students as posted on Facebook

The analysis undertaken by the students as posted on Facebook

*"The studied digital magazine was 'Tutorial 3D', in its editions it tries to bring a 3D artist for interviewing and showing some making-off of its works or of some specific work in its portfolio.*

*The interaction of the journal is presented in linear form, in a well-organized manner with videos, links, animations and images that best support its content, leaving it more interesting and didactic for the reader.*

*The magazine's identity was presented in futuristic aesthetic, using a typography with exaggerated ligatures, much similar to the new identity in the "Tron Legacy" movie. Along with a simple cover of gray colour, it has headlines aligned and of strong colours, like green, in order to draw more attention to the content covered. Also, it uses a well-rendered image of the 3D model, with drop shadow, that the magazine will show on the making of. It was also observed that the lines are exaggerated in order to better fill the space.*

*In the editorial there is a brief explanation of what the magazine will present in the following pages. Using a lot of images to, again, better filling the space and showing the reader the techniques and programs used.*

*Diagramming features rigid blocks of text and image, texts are justified with broad and poorly formatted columns. It is using Arial typography, allowing a pleasant readability. Overall, readability is medium due to the long lines, a bit tiring for the reader. Texts hierarchy is clear, titles and subtitles have a*



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*typography that differentiates them from the body of the text. Background colour varies between greenish gray and pastel, in order to break the monotony of pages.*

*The ISSUU application values the interaction with the magazine, having several tools for the user, such as following the publication, sharing in social networks, saving to your favourites and even finding a key-word inside the magazine. Also, it easily shows the number of pages that the magazine has and in which part the reader is. It is possible to move, for instance, from page 1 to page 25 in no more than 3 clicks. The application is also available for android" (group 1).*

This post-doctoral research is connected with two research groups - Contemporary Design: systems, objects and culture / UNESP and Pedagogy Design / PUC-Rio. The researchers involved organized lectures and workshops for undergraduate students in the design and subsequently applied the eBook ([www.design-educacao-tecnologia.com](http://www.design-educacao-tecnologia.com)). The process developed was an experiment to observe and verify the experience and user interaction in the teaching and learning process.

We had results that sensitized the students regarding the convergence of contemporary languages made possible by hypermedia environments; the experience with interface elements, airworthiness, the organization of information in a hypermedia system; action of the active users in the relationship; interference in documents; record reviews; processing of information; giving life to the process of knowledge construction made possible by the digital technologies and the enhancement of the teaching and learning process.

### **3 CONCLUSION**

Paulo Freire (1996), a Brazilian educator and philosopher who was a leading advocate of critical pedagogy, says that teaching demands research. There is no teaching without research and research without teaching. Teaching demands critical reflection about practice. That is why, in the permanent formation of the teacher, the key moment is the critical reflection about the practice. It is by thinking critically of the practice of today or yesterday that the next practice can be improved

This paper assumes that educators should develop new skills to teach nowadays. Among the various skills it is important to mention the ability to engage the student in the learning process, promoting research and the use of information and communication technologies (ICTs) as a tool to aid in students training.

Meeting the idea outlined above, Morin (2014), criticizes the occidental model of teaching. According to the author, the teacher has a social mission so, he states, "it is important to educate the educators". The author further states that the figure of the teacher is determinant for the consolidation of an "ideal" educational model. Through the Internet, students can have access to all types of knowledge without the teacher's presence. So, the author asks, "what makes necessary the presence of a teacher?". And answers that the teacher should be the conductor of the orchestra, watching the flow of this knowledge and clarifying the questions of the students.

As it was seen in this paper, supported by the ideas of Morin (2000), the use of ICTs in the creation of the knowledge network, brings temporariness and

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transience of knowledge, whose articulated concepts constitute the nodes of this network, flexible and always open to new connections, which favours understanding the "global and fundamental problems in order to insert in them partial and local knowledge" (MORIN, 2000, p.14)

The teacher can enrich its acting, by using mediating tools of the teaching and learning process, present in digital environments, in the case of this study, the e-book Design, Education and Technology. It was observed during the activity that students were immersed and deepened their theoretical and aesthetical knowledge for the analysis of digital magazines. The idea of content as a hypertextual, hypermedia network of non-linear navigation guided the process of the proposed activities, resulting in the teaching-learning process being more interactive and motivating.

In the fragments of reports drawn from questionnaires completed by the students about the teaching and learning process used, I conclude with the reflection bringing me to the concept of knowledge according to Morin (2014) – all knowledge is a translation, that is followed by a reconstruction, and both processes offer a risk of error. The author emphasizes that there is another vital point that is not addressed by education: the human understanding. The great problem of humanity is that we are all identical and different, and we need to deal with these two, non compatible, ideas. The crisis in education arises because of the absence of these subjects that are important for the living. We only teach students to be an individual adapted to the society, but it also needs to adapt to the facts and to itself.

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