INTEGRATION OF DESIGN THINKING AND INSTRUCTIONAL DESIGN FOR PROBLEM SOLVING IN DISTANCE EDUCATION

INTEGRAÇÃO ENTRE DESIGN THINKING E DESIGN INSTRUCIONAL PARA A SOLUÇÃO DE PROBLEMAS EM EDUCAÇÃO A DISTÂNCIA

INTEGRACIÓN ENTRE DESIGN THINKING Y DISEÑO INSTRUCCIONAL PARA LA SOLUCIÓN DE PROBLEMAS EN EDUCACIÓN A DISTANCIA

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Abstract: Design Thinking (DT) has become a buzzword in the business and design world over the last years, and recently it has been introduced on the educational scenario to foster innovation, problem solution and active participation. However, in distance education, the employment of design mentality is not recent as it goes back to the days of World War II, when the field of Instructional Design (ID) begins to be established as a methodology to solve educational problems. Despite the evolution of ID in recent years, DT has been presented as the design solution for the innovation society. In this article, we analyze the complementary use of DT and ID in the process of designing a distance learning course. The specific objective is to determine the contributions of ID and DT articulation in three main categories: process (strategies adopted to solve educational problem), product (educational solution created) and people involved in the design process. Finally, we indicate a common basis and the contributions of human centered design for distance education.

Keywords: design thinking, instructional design, innov-active methodologies, educational problem solution, human centered design.

I. INTRODUCTION

Design Thinking (DT) has become a buzzword in the business and design world over the last years, and recently it has been introduced on the educational scenario as a form of fostering innovation, problem solution and active participation of students when associated with problem and project based learning. However, in distance education, the employment of the design mentality is not recent as it goes back to the World War II days, when the field of Instructional Design (ID) begins to be established as a methodology to solve educational problems (REISER, 2001).
Distance education solutions need to be created with a design process as a main mindset, because the teaching-learning process occurs generally with the use of technological and mediatic artifacts. But, regardless of the educational modality in question, there is a consensus on the need to think and practice education in a totally innovative way (STEINBECK, 2011).

In the industrial economy, the information was scarce and the pace of change was smaller; learning occurred in schools and universities separately form the professional life. Today, in the digital economy, there is an abundance of information, and the pace of change is accelerating; the world has become a much more complex place, filled with disciplines, tools and methodologies that require a high level of connections. Lifelong learning is required, but not necessarily learning academic content, since this is an alternative type of learning. Now professionals need to develop the capacity to create and innovate, to think critically in the face of a changing world, influences and uncertainties, and need to develop the ability to create solutions for new scenarios, both at the individual and corporate levels (GABRIEL, 2013).

Despite the evolution of ID in recent years, incorporating into its theoretical body and professional practice the socioeconomic and cultural changes of the Information Era, DT has been presented (BROWN, 2008, PLATTNER et al, 2011, STEINKBECK, 2011, CAVALCANTI & FILATRO, 2017) as the design solution for the Innovation Society.

In this article, we describe the contribution of these two approaches – DT and DI – in the experience of building a distance course, more specifically in creating interfaces for a distance-learning course Learning Management System (LMS). As we mapped the limits and possibilities of each approach we were able to create solutions for a specific educational problem.

II. BRIEF PRESENTATION OF DT AND ID MAIN CONCEPTS

Design thinking is an "approach that catalyzes collaboration, innovation and the search for solutions through observation and co-creation, based on the concept of rapid prototyping and the analysis of different realities" (CAVALCANTI & FILATRO, 2017, p. 20). It is composed of a process, a mindset, methods and strategies that aim to put people and their needs at the center of a project's development, by using creativity to create solutions and employ reason to analyze and adapt them, to the real context investigated. In parallel to design thinking, instructional design is "the process (set of activities) of identifying a learning problem (a need) and designing, implementing and evaluating a solution to that problem" (FILATRO & PICONEZ, 2008, p. 5-6).
DT and DI adopt very similar phases to solve a problem. One of the best-known DT models, described in the HCD Toolkit from IDEO, is inspired by Human Center Design and also uses the HCD acronym to describe the DT phases: Hear, Create, Deliver. On the other hand, the best-known ID model uses the acronym ADDIE to for the phases of Analysis, Design, Development, Implementation and Evaluation. So, both start from analyzing a problem, then designing a solution, and finally delivering something concrete to solve the problem.

However, there are some differences between these two approaches. The main difference perhaps is that ID was born linked to education, and has the sciences of education as one of its pillars – aligned with communication sciences and management sciences. DT is an approach whose origins comes from the field of design and administration, and just recently has been applied to education. Differently from DT, ID has a theoretical history of decades and for that is much more rigid and anchored in tradition. It also has an established body of knowledge, and previous offered solutions, while DT focus on the ability to quickly create and respond to environmental changes. Despite this, if we observe the history of ID evolution, we will notice a great approximation with the notion of people-centered solutions - found in the DT (REIGELUTH et al., 2017).

In fact, since the beginning of the 21st century, some ID theorists indicate at least two paths in the future of design applied to education. Merrill & Wilson (2005), for example, proposes two diverging roads: road 1 would likely lead to substantial progress in certain key areas such as the development of automated design tools, replicable designs and validation of target-driven learning. Road 2 could also see progress in the same direction, but it would have to share the spotlight with other disciplines, and it would be more difficult to predict advances, but could include improved methods of documenting and practicing expertise; assimilation of ideas and methods from related fields; and greater attention to the person's learning needs as an integral human being.

In this sense, we identify a set of innov-active methodologies that address both needs: a claim for automatizing some aspects of instructional design, using for this the enormous capacity of computer networks and advances in artificial intelligence, cognitive computing and data analysis; and a clear demand for capturing the human perspective in process of designing educational solutions, through by adopting human centered methodologies.

Among the innov-active methodologies that articulate principles found in both ID and DT perspectives, we can mention:
1. **Active methodologies** – we know for years that human activity is essential for individuals to learn; and this is even more evident in the context of distance education or technology mediated education, where learners become responsible for managing their time and learning experience. If the person does not choose to engage with the content and in the activities proposed, nothing happens and he/she will not learn, no matter how renowned is the institution offering the course, no matter how competent are the teachers, the institution’s technical and pedagogical team, and no matter how attractive and interesting is the methodology proposed. But, even with the claim that learning is a social activity (confirmed by the popularity of social media) this is not a recent discovery (VYGOSTSKY, 1978). Thus, this activity is not only done individually, it does not sustain itself outside group interaction, communities and collectives.

2. **Agile methodologies** – it is difficult to contest that time is one of the most important variables in the educational world. Educators are paid for how much time they spend in a classroom, study subjects are distributed in the class plan based on bimonths, semesters and vacations, diplomas and certifications are issued based on the hours worked. But the present time is not the same time as the past. The virtual dimension brings a new configuration to time. The classic didactic situation, in which teaching and learning are simultaneous tasks, is no longer the only way to learn. Linearity, sequentially, and synchronicity have been challenged with new arrangements that include learning paths, microteaching, microcontents and quick-learning strategies as Minute Paper, Pecha Kucha, mini-games and quick templates, not to mention changes in the very process of managing the use of design in education, such as SAM, SCRUM and even design thinking approach, to name but a few.

3. **Immersive methodologies** – it is an increasingly repeated mantra that immersion seems to be a solution to combat the lack of engagement and the high rates of evasion in formal education. The dream of "learning by enjoying" presses education into a turn toward “edutainment", all kinds of virtual and augment reality, and also gamification (use of game elements in situations that are not games). These kinds of technologies, as Sherry Turkle (1989) put it, "can give us unrestricted access to the emotions, thoughts, and behaviors that are closed to us in real life". Mihaly Csikszentmihalyi (1997), a professor of psychology known for his studies on happiness and creativity, talks about the state of flux, a mental state of intense concentration in which tasks once considered difficult become easy and everything that is done is highly
pleasurable. The challenge "matches" with the ability to solve it and the person can achieve results that he/she did not think could be achieved. In games and gamification, for example, the immersive flow state is reached when a person sees between anxiety and annoyance over a period of time (ZICHERMANN & CUNNIGHAN, 2011).

4. **Analytical methodologies** – we cannot deny the expressive clamor for customization – which by the way Montessori already defended in the first half of the 20th century. But here it is a more data-driven personalization than human sensibility and a personalization packed with the recognition that people have distinct styles and learning preferences, and the post-industrial marketing view that everyone has the right to individualize products and services that will be consumed. The dream of creating unique and fully customized solutions is ever closer to reality, by the application of data analysis technologies, which in the educational field receives the evocative name of learning analytics. This is an educational application of the big data, a branch of statistics originally developed in the business environment to analyze business activities, identify spending trends and predict consumer behavior. The field of education has recently been pursuing new forms of application to improve student engagement by providing them with a personalized and high quality experience.

Thinking about these four innovative strands, there is a common thread: centrality in the human being, either by the personal protagonism (mainly by students) in active methodologies, by respecting the time of others in agile methodologies, by the provision of truly engaging learning experiences in the immersive methodologies and by the mass customization possibility of analytical methodologies. In this sense, as in other sectors of social and economic life, design is recognized in the context of innovation as an approach that captures the human perspective. And it has a crucial role to play in innovation because it is no longer purely technology-focused and Research & Development (R&D)-driven but increasingly it is about services, the user-experience and society (WHICHER, 2016, p. 41).

In the field of instructional design, Reigeluth et al. (2017) discuss McCombs and Whisler (1997) perspective, which defines learner-centered learning as:

"Combining focus on the individual learner (his heredity, experiences, perspectives, prior training, talents, interests, needs) centralizing on learning (the best available knowledge about learning and how it occurs and the most effective teaching practices in promoting the highest levels of motivation, learning, and performance for all students). On the premise that people are unique (because of their genetic inheritance and life experiences) and learn at different rates, they conclude that student-centered education is the only way to maximize learning – helping everyone to develop their potential" (p. 449, Kindle Edition).

Design thinking, in turn, dialogues with the principles of human-centered design
(HCD) (KRIPPENDORF & BUTTER, 2007) that emphasizes, communicates, stimulates and explicits the characteristics, capacities and behaviors inherent in the human being, allowing their desires, needs and experiences to be the starting point for the projection of solutions, products and services.

According to Krippendorf & Butter HCD approach has four pillars: second-order understanding (when the design process is carried out by taking into account the characteristics of who will be the end user); meanings (attributed to a product, process, service based on its characteristics, experiences, perspectives and visions), stakeholders network (the end users and the people involved in the design process), interfaces (human cognitive and sensor-motor characteristics, which allows the contact with the product, process, and service to provide desirable experiences).

III. RESEARCH METHODOLOGY

The research described adopted a qualitative approach, more specifically a “formative research methodology” – a kind of design-based research (DBR), that is “a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories” (WANG & HANNAFIN, 2005, p. 6-7, apud REIGELUTH & AN, 2009, p. 378). The aim is improving a particular case (product, event or combination) or a design theory for designing instructional practices or processes (REIGELUTH & FRICK, 1999; REIGELUTH & AN, 2009).

Formative research methodology is in alignment with case study approach as outlined by Yin (1984). More specifically, the design is typically a specific application of the theory. As Reigeluth and An (2009) defended that research to improve a method or design theory is the most productive kind of research when the method or theory is in the earlier stages of its development. Formative research creates or picks an instance consistent with the theory, and formatively evaluates that instance to identify how each consistent element might be improved. Then it collects and analyzes descriptive and formative data, based on the presence and absence of elements in the theory and in the case.

In this article, we analyze the design process of the Adventist Communication Training (ACT)’s that has articulated ID and DT in the educational solution proposed to for the online course. The specific goal is to determine the contributions of Instructional Design and Design Thinking articulation in three main categories proposed by Cavalcanti & Filatro
(2017): process (strategies adopted to solve educational problem), product (educational solution created) and people involved in the design process.

IV. ID AND DT INTEGRATION IN THE INVESTIGATED CONTEXT

The Adventist Communication Training (ACT) was created to motivate and train about 190,000 local Church Communication leaders throughout the world. The initial challenge was to develop a student centered training that overcame global issues like cultural, idiomatic, and context diversity of more than 150 countries.

In order to design the educational solution, the ADDIE methodology was adopted, starting with the contextual analysis phase (FILATRO, 2015) carried out with the participation of a sponsor, a project manager, an instructional designer coordinator and a technical specialist. Several meetings were held with the Communication Department leadership of the Seventh Day Adventist Church. Also, documentation on church statistics around the world was made available as well as existing or in-production communication resources, including web sites, films and internal reports. The Contextual Analysis Report systematized information about a) learning needs; b) target audience; c) institutional potentialities and constrains, as follow.
From this initial analysis, a general proposal for a hybrid solution was defined: a 30 hours self-paced on-line study, mixed with a face-to-face practical collaborative challenge conducted by local mentors, and offered initially in four languages – English, French, Spanish, and Portuguese. Six independent study units composed this online course. For each online unit, theoretical capsules, good practices examples, video interviews, quizzes, minigames, and activities with automatized feedback would be developed.

A trained tutor would be available to answer specific questions sent by the participants through the LVE mailbox or question forum. For the practical and collaborative challenge, a face-to-face marathon based on the design thinking approach would be conducted by local mentors, with activities designed to develop a collaborative solution related to special projects in church communication. Summing up, the educational solution resulted in the proposition of what we call **innov-active methodologies**, as represented in the table below.
Table 1 - Innov-active methodologies created for ACT by integrating ID and DT

<table>
<thead>
<tr>
<th>Innov-active methodologies</th>
<th>ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active methodologies</strong></td>
<td>Practical face-to-face marathon where course participants will participate in challenges using the DT approach as a problem solving methodology to create solutions to real problems related to communication leadership faced at their local church and community.</td>
</tr>
<tr>
<td><strong>Agile methodologies</strong></td>
<td>Microcontents (theoretical capsules), minigames and design thinking face-to-face projects.</td>
</tr>
<tr>
<td><strong>Immersive methodologies</strong></td>
<td>Content gamification through minigames exploring critical incidents related to communication leadership.</td>
</tr>
<tr>
<td><strong>Analytical methodologies</strong></td>
<td>Analysis of data recorded in the virtual learning environment from structural gamification to provide personalization.</td>
</tr>
</tbody>
</table>

Source: the authors

The use of active, agile, immersive and analytical methodologies in ACT’s activities and content organization was greatly influenced by the integration of ID and DT processes and methods. It was also achieved by the involvement of people that had a variety of academic and professional backgrounds and collaborated to the creation of an online course based on innov-active methodologies. Once the educational solution proposed was approved, the team moved on to the design phase, composed by elaboration of the Instructional Design Matrix – a detailed ID specification document of the objectives, contents, duration, activities, tools and evaluation for each unit of study, as follow.

Figure 2 – ACT’s Instructional Design Matrix fragment

Source: the authors
In the development phase, contents and other resources – as study syllabus, video interviewing and games scripts, questionnaires and templates were elaborated and submitted to the validation of the sponsors.

To initiate the production of the media foreseen for the course, DT approach was adopted in addition to ID classical process. This was carried out in a Brainstorming Meeting, which was attended by a multidisciplinary team composed of project managers, instructional designers, web, graphical and game designers, video producer, visual artist and the global communication director – the design thinkers for this project.

As part of Brainstorming Meeting, initially the group participated in distance courses benchmarking presentation, including a detailed analysis of LMS-based interface examples (Coursera’s MOOC model, UK OpenLearn’s units of study model, and UNASP Tutor Training for Distance Education course at MoodleRooms model), and of a scenario-based interface example (Sebrae’s scenario-based self-paced study).

After knowing the ID proposal of ACT – composed by multimedia contents, self-paced and collaborative activities and other resources as tutoring support guide and disclosure materials – participants experienced some DT strategies, such as Persona, Brainstorming, and Rapid Prototyping, in order to define the visual identity for the whole course, as illustrated bellow.

**Figure 3** – Design Thinking strategies experienced by the Brainstorming Meeting participants

<table>
<thead>
<tr>
<th>Persona</th>
<th>Tutor Persona</th>
<th>Communication director</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Persona** – participants created fictitious characters for the typical student, the typical online tutor, and the typical communication director at the local church administrative level who would assume the role of project manager. Each persona had the similar characteristics as the group of people involved in the problem analyzed.

**Brainstorming** – a group dynamic that would lead the design thinkers towards creating and categorizing ideas that aimed to solve the design challenge based on the Persona findings.

Categorization of ideas created

**Rapid Prototyping** – fast creation of prototypes to visually represent the solutions proposed by the design thinkers for the design challenge analyzed by the group.

<table>
<thead>
<tr>
<th>Prototype 1 – The Journey</th>
<th>Prototype 2 – The Bridge</th>
<th>Prototype 3 – The Character</th>
</tr>
</thead>
</table>

Source: the authors

This sequence of strategies resulted in a variety of ideas that were evaluated by participants through the Feedback Capture Grid, and combined into a single prototype. It was then developed as a resource that would subsidize the final version ACT’s visual identity prototype contemplating three metaphors – the journey, the bridge and the character, as shown below.

**Figure 4** – ACT’s visual identity

| Initial version for ACT’s visual identity |
After some refinements, the final prototype was presented to a qualified audience of 800 leaders from more than 60 countries gathered at a global communication event held in Brazil. In the application of an unidentified questionnaire, the evaluation of 237 respondents was obtained (30% of total). Follow the record of the responses.

1. Would you be interested in participating in ACT - Adventist Communication Training?

   - Yes, absolutely! 78.9%
   - I think so. 19.4%
   - No way! 1.7%

2. Would you adopt / recommend ACT to your local church communication leaders?

   - Yes, absolutely! 84.7%
   - I think so. 14.8%
   - No way! 0.5%

Besides these simple acceptance questions, respondents were invited to give suggestions about how ACT can make a difference on communication leaders at local churches. Among the open answers, we can highlight the concern with the translation to different languages and the contextualization for the different countries and cultures involved in the action.
V. FINAL REMARKS

From the analysis of the process, product and people, we can conclude that the DT approach can complement the classical DI process, mainly because it allows the effective participation of various stakeholders in the macrodesign of an educational solution. Also, DT let the design thinkers to prototype solutions, which made the creations visually concrete which helped with experimentation and idea validation. This level of design entails innovations, and innovations are what DT has proven to know how to do.

However, it seems that the DT does not apply so well to the micro level of design, one dedicated to the fine development of study units, screens or pages, including the sub-stages of authorship, routing and production. Given the amount of detail and the volume of work involved, it becomes unfeasible to include stakeholders in each required activity, just as the expertise of the various dimensions required to achieve the best end result cannot be dispensed with.

Finally, in ACT’s design process, the integration of ID and DT was crucial for the proposition and implementation of what we called innov-active methodologies (described in table 1). This experience led us to believe that ID is a more structured and focused approach that should be used to design agile and analytics methodologies for educational contexts. On the other hand, DT is a more human centered approach and proved to be a great resource when designing active and immersive methodologies for distance learning. This combination seems to be a contemporary alternative to achieve the educational demands of the digital society.

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