Design for Inclusion, Gamification and Learning Experience

edited by
Francesca Tosi, Antonella Serra, Alessia Brischetto, Ester Iacono

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Serie di architettura e design
FRANCOANGELI
Ergonomia&**Design**

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Partner NGOs

SERCEV – The Association for Well-being of Children with Cerebral Palsy, Ankara, Turkey

OccuTherapy – The Occupational Therapy Association of Turkey, Ankara, Turkey

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Preface

by Ozge Cordan and Demet Arslan Dincay

"The Practicing Universal Design Principles in Design Education through a CAD-Based Game", PUDCAD, is an EU PROJECT, coordinated by ISTANBUL TECHNICAL UNIVERSITY, founded by Erasmus+ Program KA203 and conducted by the Center for European Union Education and Youth Programs.

All of PUDCAD partners, ITU, Department of Interior Architecture, Istanbul, Turkey; TH-OWL, OWL University of Applied Sciences and Arts, Department Detmold School of Architecture and Interior Architecture, Detmold, Germany; LAB, Institute of Design and Fine Arts, Lahti, Finland; UNIFI, University of Florence, Florence, Italy; POLIMI, Department of Design, Milano, Italy; BAU, Faculty of Communication, Istanbul, Turkey; SERCEV, The Association for Well-being of Children with Cerbral Palsy, Turkey; ED, The Occupational Therapy Association of Turkey, contribute and improve the project with their broad experiences and proficiencies on Universal Design, education and research hand in hand.

PUDCAD Project aims to support and strengthen the Universal Design awareness in education within international networks. It not only tries to integrate Universal Design principles to design education, but also widens the awareness of students about accessible design as an important topic for national policies and researchers. The main output of the PUDCAD Project involves a design game on a CAD-Based platform which aims that undergraduate design students would learn and practice the Universal Design principles through an empathetic approach. The game will focus especially on inclusive high school design for the students with Cerebral Palsy (CP) that includes several distinct forms of impairment of motor functions which cause different movement disorders.

PUDCAD Project is a three year project (01.09.2017-01.09.2020) and it includes 5 student workshops, 4 teaching at student workshops as learning, teaching, training activities and 3 conferences as multiplier events during this term. Conferences will actively help to reach more people and disseminate the aims and outputs of the project.

As part of PUDCAD Project, the conference (E3) was organized by Department of Architecture (DIDA), one of the project's partner on the 10th of May,

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2019 at Florence, Italy. The one-day conference was themed as “Designing for Inclusive Learning Experience”. The conference has three sections titled as “Design for Inclusion”, “Game and Gamification Experience” and “Design for Learning” sequentially. After Ozge Cordan’s speech on “PUDCAD Project” and Francesca Tosi’s speech on “Ergonomics and Design”, there were oral, digital and poster presentations as well as student’s presentations of PUDCAD Florence Workshop in the conference.

In this scope, the proceedings book has 37 papers including contributions of Ester Iacono, Alessia Brischetto and Antonella Serra as chairs of each session in the conference. The following papers explores the related subjects in detail. Within this general framework, we believe that the proceeding book will widen the perception and perspectives of both PUDCAD Project’s partners and the other audiences participated to the conference.

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Introduction

by Francesca Tosi

The book presents contributions on Ergonomics and Design/Human-Centred Design submitted at the Conference "Designing for Inclusive Learning Experience" (10 May 2019, Florence – Italy) which offered researchers and professionals a forum to share research and best practices in this scientific field. The conference topics regard the application of Human Factors to training, education, learning sciences, and Universal Design for learning.

The Ergonomics approach, and Human-Centred Design/User Experience principles and methods, applied in recent years in the fields of interface design and product design, are also beginning to develop today in the field of training, education and learning experiences. In particular, the principles of behavioral and cognitive science, combined with design, are extremely relevant to educational content design and the effective application of technology to provide an appropriate learning experience.

The frame in which the conference is located is a program of three multipliers events. The first one – entitled "Man, space and inclusion" (19 October 2018, Detmold, Germany) – had the purpose of investigation the UNIVERSAL DESIGN and the last one (24-26 June 2020, Istanbul, Turkey) will focus on the macro-theme PLAY AND EDUCATION.

The area of interest of this second conference is, therefore, the Ergonomics and Design/Human-Centred Design approach in all project-facing joints – physical and virtual – for learning and in particular: Ergonomics in Design, Universal Design and Learning Experience (theory and good practices), Human-Centred Design and User Experience, Game Design and Gamification, Competency-based learning, Designing the learning experience, Learner engagement e-learning, Mobile learning), Web-based training, Blended learning, Usability of learning technology, Advanced learning technologies.

The authors participated in three forms: oral presentation, poster presentation and digital presentation. In particular, the latter mode of participation has been encouraged to facilitate the participation of territorially distant scholars: New Zealand, India, USA, South America etc. and allowed the comparison to be extended to a very large number of researchers, creating an opportunity of considerable interest for dialogue on these issues. The 36 submissions pre-

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sented to the Conference were written by 101 authors from 9 countries – Italy, America, Brazil, New Zealand, India, Japan, Turkey, Germany, Finland – and were divided into three main areas – Design for inclusion, Game and Gamification Experience, Design for Learning, which correspond to the three parts of the volume. The research results and the design application presented are of great interest and they describe the state of the art in the three areas covered.

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30. Teaching Design Thinking Through Flipped Classroom

by Marita Canina, Carmen Bruno, Laura Anselmi

Abstract

Digital technology has improved our lives in different ways and domains, also in the education field. Innovative teaching methods should integrate the use of digital technologies to enhance student engagement, support any education environment and encourage both teachers and learners that are now relying on them for a different purpose from conducting research to collaborating with peers. The actions have to foster innovative didactics that give value to the learner's passions and skills, increase flexibility and trans-disciplinarity, and boost project-building didactics.

These changing are also occurring in the design process education.

This paper aims to present a creative learning experience, based on the "flipped classroom" methodology enriched by the integration of other learning engagement strategies, developed by IDEActivity Center to explore the Design Thinking (DT) process and tools. The teaching project promotes forms of innovative learning of the Design Thinking (DT) process integrating different engagement strategies for adult learners including, Think-Pair-Share, Role-play, Flipped-Active Learning, Problem-based learning.

The workshop designed for flipped DT learning is an experiential format applicable in any context, whether educational or corporate, in a public or private institution. The learning experience was experimented in a didactic module of Product Design on a Master's course at the Politecnico di Milano.

Keywords: *Design Thinking, Adult learning, Engagement strategies, Critical thinking, Problem based learning.*

30.1 Introduction

Over the past few years, the research has highlighted the potential value of student-centred learning environments (Kim *et al.*, 2014). When adult learners

are active in their learning they are able to develop critical thinking skills, receive social support systems for the learning, and gain knowledge in an efficient way (Karge *et al.*, 2011).

The engagement is considered multidimensional, involving aspects of learners' emotion, behavior, and cognition (Fredricks, Blumenfeld and Paris, 2004). Designing a new learning experience means including all these dimensions. As designers, we embraced the ideas of researchers that considers engagement as a process, instead of conceptualize it as a result (Appleton, Christenson and Furlong, 2008; Skinner *et al.*, 2008).

The teaching project presented here, promotes forms of innovative learning of the Design Thinking (DT) process integrating different engagement strategies for adult learners including, Think-Pair-Share, Role-play, Flipped-Active Learning, Problem-based learning. The process for the construction of the DT module via flipped classroom started with the study of andragogy, a focus on the engagement strategies, and the exploration of the skills that young adults ought to acquire to meet the future challenges (European Commission, 2007).

30.2 Learning Engagement Strategies

Knowles, Holton and Swanson (2005), that extensively studied adult education, coined the term "andragogy" to signify methods and core principles used to build more effective learning processes for adults' learner. Knowles emphasizes that adults need to be involved in the preparation and evaluation of their instruction and expect to take responsibility for decision; these aspects combined with motivation creates a strong ecosystem to acquire knowledge.

Andragogy makes the following assumptions: adults need to know why they need to learn something; they learn best by participation in relevant experiences and practical information, so their approach to learning is problem-solving rather than content-oriented; they learn best when the learning subjects have immediate relevance to their job or personal life (Knowles, Holton and Swanson, 2005). Fig. 30.1 shows the core set of adult learning principles with the six principles of andragogy.

It follows that andragogy means that adults learning needs to focus more on the process and less on the content being taught. Strategies such as peer-learning, role-playing, problem-based experience, case studies, and self-evaluation are most useful. Instructors adopt a role of facilitator or resource rather than lecturer or grader. In order to define the specific goals and purposes of the teaching project, we carefully explore effective teaching strategies designed to enhance skills and gain content knowledge.

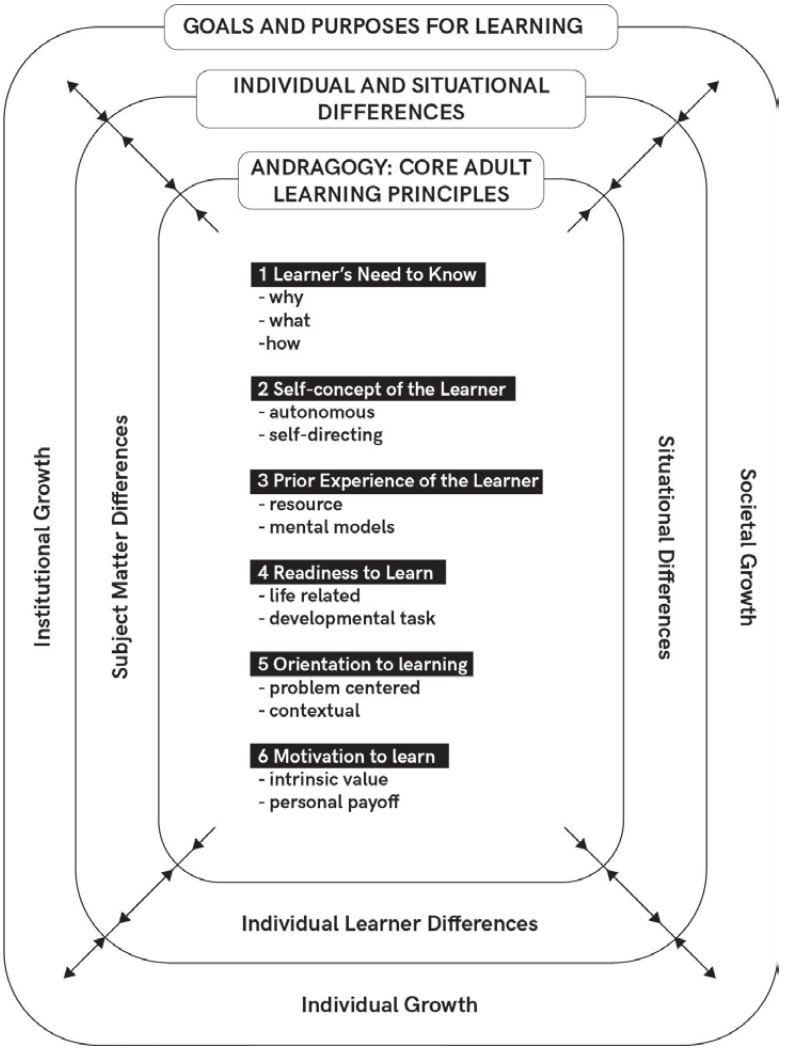

Fig. 30.1 - Andragogy in practice. Readapted from Knowles, Holton and Swanson (1998)

We highlight here those that we chose because they best fit with the DT learning experience: Think-Pair-Share, Flipped-Active Learning, Role-play, Problem-based learning (PBL).

The ***Think-Pair-Share*** is an active and cooperative learning strategy, developed by Lyman (1987), that invite students to think about a specific topic, pair with another learner to examine their own thinking, and then share their ideas

with the group to develop the ability to consider and appreciate the different viewpoints of their peers. Think-pair-share is designed to help the student to understand the concept of the given topic, develop ability to filter the information and formulate an idea or thought, and draw conclusions.

We have taken into consideration the ***Read-Write-Pair-Share***, a variation proposed by Fisher, Brozo, Frey and Ivey (2007), in which in the first part the student reads information independently and then writes his/her considerations about it. The knowledge is enhanced by the conversation and expansion of the thoughts with the peers (Karge *et al.,* 2011).

Flipped learning is an active learning approach in which the traditional learning material that transmits information is given before class, so that class time is dedicated to deepen understanding through discussion with peers and problem-solving activities facilitated by teachers (Bishop and Verleger, 2013; Andrews *et al.*, 2011). Abeysekera and Dawson (2015) define the flipped classroom as a set of pedagogical approaches that: (1) move most information transmission teaching out of class, (2) use class time for learning activities that are active and social and (3) require students to complete pre- and/or post-class activities to fully benefit from in-class work. Bull (2013) added: "*using technology in a way that allows the teacher to spend more time addressing individual needs of learners and interacting with students instead of lecturing*".

According to Talbert (2014), for a flipped classroom experience to be effective, it should include: 1. highly structured pre-class assignments which are geared towards introducing the students to the new theoretical concepts; 2. means of accountability to ensure that students complete the required pre-class assignments and out-of-class work; 3. well-designed sense-making activities for the students to engage with during lecture time; 4. open-lines of communication throughout the course so that students can interact freely with the instructor. Those principles represent the theoretical frameworks that guided the design of the learning experience activities.

We then considered two learning strategies that are very close to the intrinsic nature of design: solving complex problems in real situations. In fact, the Role play and the PBL allow to activate simulation scenarios.

Role-play allows learners to explore realistic situations by interacting with other people and playing roles that enable spontaneous human interaction involving realistic behaviour. It provides the possibility of significant learning, allowing not only a self-learning about how to think and react in a particular situation and possible suggestive solutions for resolving the problem or analysing the situation, but also helps in understanding others perception about the situation or issue.

Problem-Based Learning (PBL) (Barrows and Tamblyn, 1980) activities usually focus on actively engage student in learning communities by solving complex, openended problems/scenarios (Karge *et al.*, 2011), collectively and creatively.

Problems are designed to introduce the material as well as provide learners with a deeper learning opportunity. The PBL process encourages participants to take on the responsibility for their learning by applying their research, and their collaboration and also providing input from their relevant past experience and knowledge (Savery, 2006).

We took into consideration these strategies for designing a framework for the flipped classroom DT module, described in the next sections.

30.3 Design Thinking Process

The objective of the didactic experience is teaching the DT process through the flipped classroom approach enriched by the integration of the learning engagement strategies described above. The experience has been constructed on DT process configured by IDEActivity Center (2014). It is a Human-Centred Design process merging Creativity and Design Thinking approach to involve people with different competencies to actively collaborate for the definition of a design challenge and the development of innovative ideas or strategies.

It focuses on two main stages, Explore and Generate, both divided into two phases: Clarify Goals and Define Opportunity the former, and Idea and Prototype the latter. Each process phase has specific objectives, performed through the integration and amalgamation of different known and ad hoc techniques and tools designed to stimulate creativity and generate suitable concepts in several creative sessions.

The four phases defined above represent the key points of the DT process to be transferred, learned and carried out through the didactic experience.

30.4 DT's Experiential Module in Flipped

According to the considered engagement strategies, the designed module is based on the development of a ***project-based activity, starting from a design brief*** (Canina and Bruno, 2018). This active engagement experience allows understanding the fundamental notions of DT, studying in-depth all the phases of the DT process and its tools in the pre-class work activity, and putting them into practice on a design challenge during in-class activity.

The activities designed for the module intend to let the learners to completely organize, prepare and run the collaborative session according to ***the pre-established roles.*** The module has been designed with role play mechanism in which the participants must take on a role throughout the course of the experience.

As stated above, the underlying premise of "flipped classroom" is that students review lecture materials outside the classroom coming to class ready to participate in learning activities, therefore the experience has been designed following the three distinctive times of the flipped classroom, defined as follows: "Before Class" and "After Class" which take place remotely and "During Class" which takes place in the classroom in the presence of the lecturers. The module makes use of the social media tool "Slack" as a digital platform to share with students the learning material. It both guarantee a common thread through the activities in the classroom and remotely, keeping a continuity of learning, and facilitate the collaborative work using a social language suitable for a new generation of learners.

We have therefore worked on three specific levels: ***acquisition of the basic notions of DT,*** exploration of ***group dynamics and process facilitation between peers,*** and ***development of soft skills*** useful for the process (creativity, problem solving, communication, etc.)

In order to reach the learning goals, the activities and the specific tools have been designed considering what the student should perform before, during and after the lesson, also assigning an estimated time for each activity. We planned in details the in-class learning activities and the pace to be kept as well as the learning activities to be performed outside the classroom, to be realistically quantified with respect to the overall commitment of the student. The whole DT process is therefore practiced collaboratively during the in-class activities once individually explored in remote through the didactic material prepared and shared by the research team.

The next sections discuss the setting of the experience. For the sake of clarity, the designed activities are described through the chosen learning engagement strategies.

30.4.1 The Flipped Classroom Design Framework: Experiential Learning

We designed a creative learning experience, based on the "flipped classroom" approach and problem-based approach with role-playing activities to explore the Design Thinking (DT) process and tools.

Read-Write-Pair-Share

A first peer-review activity allows an overview of the DT process. In this scenario, we divide learners into teams giving them three questions: 1. Find the most exhaustive definition of Design Thinking. 2. In what kind of field is applied and why? 3. Find three successful cases of application.

The students are given quiet time (30 min) to search and write the answer. Students are then cued to discuss their responses, noting similarities and differences. It is important to give students enough time to share what they found and decide a common answer to the 3 questions. After this task students are invited in 2 minutes to share publicly using a slide.

This activity lets students start from a common background of the DT process, its tools and its practical application.

Team Role-Play

The didactic experience has been developed considering the integration of role play as game mechanisms to involve people in active collaboration, deep immersion and reflection (Simsarian, 2003; Canina and Bruno, 2018).

Three roles have been defined to create the right conditions to generate debates, lead reflections and thoughts, collect and reelaborate insights, and to ensure active collaboration, both in class and out of class.

The 3 roles are those necessary for a design team that has to solve a collaborative design challenge.

- Facilitators: make the collaboration easier for the participants supporting the team working at its best. They have to learn how to manage the activities Before the class design session and facilitate them During class.
- Researchers: workforce that will bring information about the topic key insights to the table. They have an independent role of research Before the class activities and report to the Slack Guardians. They also have a collaborative and active role During the in-class design session.
- Slack Guardians: guide the community and manage the communication with the team, Before and After class activities, through Slack. A Slack Guardian keeps the conversation about the different topics going, asks trigger questions that can help the Researchers to stay on the right track and suggests sources of inspirations such as interesting links, new tools or case studies.

For each role precise instructions have been created to carry out the “Before”, “During” and “After” class activities, explaining the meaning of their role,

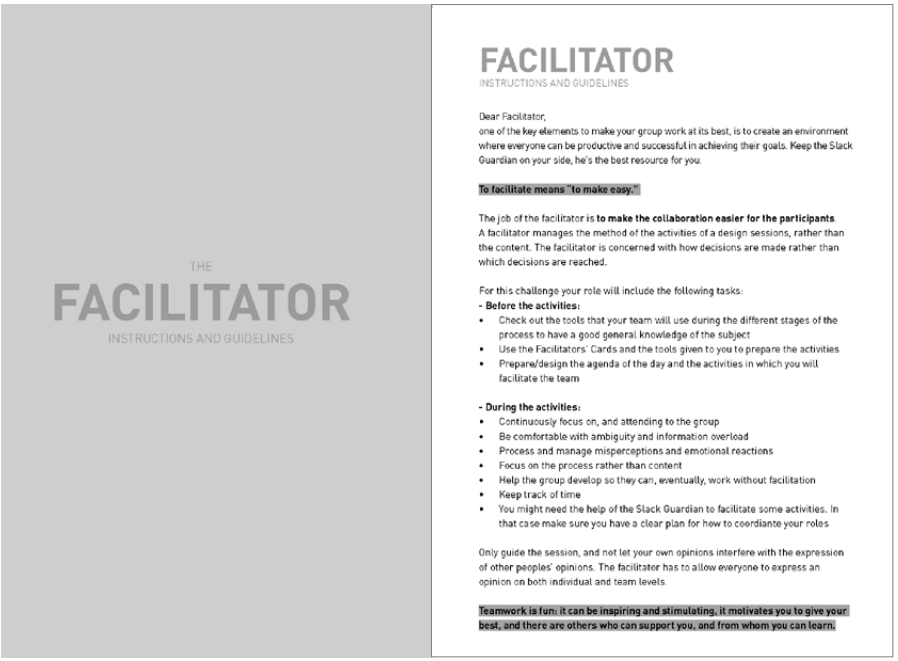

Fig. 30.2 - The role instruction cards

the didactic material available and the interaction with the "Slack" tool and the fellow students.

Flipped Classroom

The activities planned for the Explore and Generate phases have been divided into two consequential blocks so that each stage has a "Before Class" time for preparation and learning, a "During Class" time for practical activity and reflection and an "After Class" time for feedback of the work.

The exchange of roles among the learners in the explore and generate stages is required to allow all the participants to perform differently the collaboration within the teamwork, either as the facilitator who manages the team and leads it to achieve the objectives throughout the whole process or as a researcher or community manager (Strayer, 2012).

Before class. This is the moment when the learner studies and reflects autonomously on the didactic material provided by the lecturers through the digital platform.

The didactic material includes role instructions, learning materials, tools and guidelines aiming at preparing the learners in putting the process in practice during the in-class activities according to the pre-established roles. The Facilitators receive the role instructions and the "Activity Cards" which explain in detail the objective of each activity, how to facilitate the group during the activity and the results to achieve. For each activity, a collection of design tools is made available as well as a collection of learning materials. They also receive an agenda of the activities to fill in by selecting the most suitable tools manageable from them in the provided collection.

The Researchers received specific instructions for their role and a series of tools and guidelines which support them in their research activity before delivering in the classroom. The correct performance of this activity guarantees good results especially in terms of solving the design challenge.

At this moment of the didactic experience, the Slack Guardians have the fundamental role of managing the learning inside the digital community, by making the participants able to reflect on the didactic material provided, on the ongoing results of the design challenge, enabling them to develop critical thought. This role is fundamental because it guarantees the correct preparation of the participants in view of the activities in the classroom. They receive through the Slack channel instructions and stimuli on how to conduct their activity.

During Class. This is the moment in which the learner actively puts its acquired knowledge into practice, reinforcing it with the support of the lecturers. The activity in the classroom is carried out like a real session of collaborative design. The participants, each one with its own role, are working in teams, previously formed.

The Facilitator has the task of introducing the activities to the group, carefully explaining their objective, the ways of carrying them out and the result to be obtained. One after the other, the activities are carried out by the group under the guidance of the Facilitator with the support of the Slack Guardian. They should put the Researchers in the conditions of using the prepared and selected tools for the activity, sharing with them the knowledge acquired and enabling their creativity to solve the design challenge.

The team is constantly followed and supported by the lecturers/tutors who provide the roles with tips and insights to best carry out the activity. They guarantee efficient learning by supporting the teams in forming a well-established and cohesive group, suggesting activities (ice-breaking and energizers) that create a favourable creative climate, and encourages a team spirit and the sharing of objectives. They also support individual learning by a debriefing at the end of the activities, to reflect on the work done.

After Class. Learners reflect autonomously on their classroom experience, providing feedback on the results obtained in the collaborating phase and sharing it through the dedicated Slack channel.

The channel is the box keeping of the learning journey that allows for an in-depth reflection of the achieved results and of the critical points throughout the whole process.

30.5 Conclusion

An in-depth reflection on the designed module is necessary regarding the complexity of the process and the amount of teaching material. The learners' main difficulties were in understanding the mechanism and rules of the flipped classroom and in selfmanaging the teaching material provided.

They appreciated the in-class interactive activities which put their creativity and their intelligence at the centre. Compared to traditional DT training, the flipped module has the potentialities of giving learners more responsibility for their learning experience providing them with well-structured guidance to facilitate the DT process driving their peers in the development of a design project. The personal interaction motivates students and engages the entire class. This module takes the advantages of problem-based learning activities developing learner's problem solving, critical thinking and decision-making skills, encouraging critical reflection and enabling the appreciation of ambiguity in situations.

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Designing for Inclusive Learning Experience

Conference – Florence, 10 May 2019

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FrancoAngeli
La passione per le conoscenze