Doctoral School on Engineering Sciences
Università Politecnica delle Marche

Extended summary

Teaching Practice and Learning Design: a Reflective Model for Professional Growth

Curriculum: e-Learning

Author

Alessandro Arpetti

Tutors

Prof. M. Cecília C. Baranauskas

Prof. Tommaso Leo

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Abstract. The increasing use of technology in education and the failure to achieve the expected results have brought attention to the Learning Design (LD), in order to promote better educational outcomes and a more profitable use of technology. LD is a complex activity that requires a large number of competences. In recent years, research in the field has led to the development of numerous models and software tools to support the practice of design, but, despite the efforts, the diffusion among teachers remain limited. This thesis relates to the LD research field and the development of teachers' competencies and professionalism. The main objective is to address the problem of understanding and dissemination of LD between teachers non-specialist in design, developing solutions that can facilitate the design process, promoting the sharing of educational designs and the professional development of teachers. Inspired by the approach suggested by the Educational Design Research, the research was carried out in collaboration with a group of teachers of Italian as a second/foreign language from different countries. Collaborating at a distance via a web site developed for the project, teachers were actively involved through semio-participatory design practices which allowed a greater understanding of the use, the expectations and the meaning they attribute to the design in education. The main results of this research are the definition of a LD approach based on the epistemology of practice and the implementation

of LEDITA tool (Learning Design for ITAlian language), a web application for creating, editing, sharing and reuse of designs. Finally, these results were validated by exploratory analysis that revealed a good level of usability and understanding by teachers non-specialized in design.

Keywords. Design Model, Knowledge Sharing, Learning Design, Teachers Professionalism, Teaching Reflection.

1 Problem statement and objectives

In recent decades, the definition of our age in terms of learning society has become popular and, with it, the figure of teacher has although changed, going from professorial and knowledge holder to facilitator and mediator between learners and their available contents [1]. The learning society is characterized by the access to information and by the presence of numerous media, which offer learners and teachers the opportunity to communicate, collaborate, and manage information. The availability of content and ease of communication open up the horizon to a networked society [2], in which the exchange, interaction and comparison are essential for the formation and human development.

In this scenario, technologies play an important role, not only for the opportunities, but also to influence the development of new generations, becoming part of our lives and, inevitably, of the practices of teaching and learning [3]. Educational technologies represent therefore a major challenge to adapt educational experiences to technological and social developments. However, even though efforts and resource investments have been significant in last years, results are slow to arrive.

Educational policies have in fact called for an increasing use of technology in the classroom, but it does not seem to have had a great impact in the teaching practice [4]. Cuban [5] argues that even though technologies change, the lack of use seems to derive mainly from the same difficulties. To ensure that technologies can be used profitably, it is needed to develop new competencies and new digital literacy skills [6]. Teachers are expected, therefore, to develop a rich professional competence, composed by a set of knowledge, skills and attitudes needed to address educational events [7].

However, reflection on teacher's professionalism cannot ignore the more general question about knowledge definition and, more particularly, that about pedagogical knowledge. These reflections are, however, relocated to a meaning horizon in which the pertinent knowledge is that able to locate any information in its context and, if possible, in the whole in which it is inscribed [8]. This ecological approach to the knowledge requires the presence of teachers able to analyze their own practices, to account for their decisions, to develop personal strategies and modeling, and to design educational intervention useful in different situations, maintaining a continuous relationship with both learners and cultural contents.

Initially, the support to the educational design practice was faced by the Instructional Design, with the definition of specific design approaches and methods [9 - 12]. Lately, at the end of the 90's, the Learning Design research field arose, focusing on the development of tools, design methods and approaches to help teachers design and sharing pedagogically effective learning activities. The Learning Design aims to rethink the instructional approach with design models that emphasize the role of the student, through the shift to the process of the design and with a learner-centered focus [13].

Regarding the teachers, the design of educational interventions can be very important to organize a teaching repertoire provided with specific skills, useful to deal with the possible problems that occur in the classroom [14]. However, Learning Design is not a simple practice, but involves a wide set of knowledge, skills and competencies, including: learning theory and its applications, course design principles and procedures, and use of different media and technologies.

Research in this field has attempted to address these issues and to develop useful tools for teaching and learning practices. However, despite these efforts, the research results seem

still far from the practice of teachers and proposed solutions suffer from a limited diffusion and a lack of evidence about their effectiveness.

2 Research planning and activities

The approach adopted for this research is inspired by the Design-Based Research paradigm [15 – 18], and, in particular, on the interpretation proposed by McKenney and Reeves [19] called Educational Design Research (EDR). This approach can be defined as a kind of research in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigation, which yields theoretical understanding that can inform the work of others.
The relevance of EDR has to do with its connection to practical applications, in which scientific understanding is used to frame not only the research, but also (alongside craft wisdom and creative inspiration) to shape the design of a solution to a real problem. Research is conducted – to varying degrees – in collaboration with teachers, not solely for or on practice; in this way, solutions to examined problems are developed through successive cycles of analysis, design and evaluation
The collaboration with the practitioners occurred through the creation of LEDITA (Learning Design for ITAlian language) project that collected the participation of about 90 teachers of Italian as second/foreign language from 16 countries. In this regard, we developed a web portal through which teachers have actively participated in a number of participatory design practices, contributing significantly to the understanding and further development of research questions and solutions.
In this specific instance of LEDITA, the final research goals are to tackle the problem of LD understanding and dissemination by teachers of Italian as a second/foreign language and to develop, in collaboration with them, software solutions that can simplify the design process. These objectives are intended, therefore, to investigate theoretical understanding of LD through the definition and integration of more simple design process interpretation, and to respond to the practical problem of LD use by teachers through the development of a software solution aimed at creating a community for the sharing of designs and at facilitating the professional growth of teachers.
The LEDITA research was organized in three phases.
First research phase was represented by a micro-cycle of problem analysis and exploration, approached through a literature review, an analysis of existing LD software tools and an exploration of the meaning that teachers attributed to the practice of design. The results of these investigations have fostered the definition of a cyclic design model based on the epistemology of practice.
Following this first phase, a meso-cycle consisting of two micro-cycles started: the former was characterized by the specification of user requirements, the definition of a LD model and the design and building of a LD software tool; the latter was characterized by the evaluation and reflection on designed solutions through usability explorations and teachers feedback analysis.

3 Analysis and discussion of main results

Starting from an extensive review of the literature and from the observation of the gap between the expected results and the effective dissemination and use of Learning Design among teachers, it has been conducted a Heuristic Evaluation of the usability of two latest generation tools in order to test the hypothesis that this gap stemmed from an extreme complexity of representation and use of existing Learning Design software tools. The results showed the presence of serious usability problems and allowed the identification of five general guidelines for the development of LD software with a better level of usability by teachers not specialized in Learning Design. These results highlighted that more attention to HCI principles and their application in the complex scenario of designing in education is needed to design and develop effective Learning Design software tools and leading the focus of the research on the real teaching practice. In this manner, the needs, characteristics and values of end-users can be considered in the development of new solutions, useful for the dissemination of LD. The relationship between the teachers' practice and the LD have therefore been investigated through a review of the literature and a study conducted by means of semi-structured interview to the teachers collaborating with the research project. The results obtained showed a rich scenario, from which it was possible to highlight not only the importance of the technical aspects related to LD, but also the central role that it occupies in the development of competences and in the professional growth of teachers. Main contribution of these activities is the definition of an iterative design model based on the Schön's epistemology of practice [20], composed by a cycle of (re)design, action and reflection. Furthermore, another important point is the highlighting of the most important elements for the development of solutions to the LD that were sufficiently flexible to adapt to the complex educational scenario and probably close to the language and educational practice of teachers.

The relations between teaching practice and LD was investigated by conducting semio-participatory practices [21] with a group of teachers at a distance. The objective of this study was to understand the meaning that teachers make to issues regarding learning design practices and representations, aiming at eliciting user requirements for a prospective LD software tool. Results have allowed synthesizing a number of requirements elicited from contextualized and well-discussed information. Main contribution of this activity is the elicitation of aspects of the professional world of potential end-users, with their needs and expectations. Furthermore, it was possible to synthesize a number of practical indications useful for developers interested in development informed by the practice of the main interested parties.

The results of previous research studies were synthesized in a detailed framework for the creation, the orchestration and the reuse of designs among a community of teachers, useful to promote the professional development of teachers and the sharing of knowledge between novices and experts. Reaffirming the usability importance for the dissemination and reuse of design in education, an exploratory analysis of usability was conducted through an informal test with 6 members of the InterHAD (Human-Digital Artefact Interaction) research group at the Institute of Computing in the University of Campinas (UNICAMP). The results have shown a good level of usability, opening the perspective for the implementation of the LEDITA approach in a software tool. The main contribution of this study is the connection of the cycle of design, action and reflection proposed by the DAR3T model with a design approach developed through a process of recursive reflection-

in-action and reflection-on-action, which allows designing and reusing educational activities in dialogue with a specific context.

Finally, the results of previous activities converged in the development of the LEDITA tool, a LD editor developed within the LEDITA participatory research project for the representation and sharing of designs between a community of teachers of Italian as a second/foreign language. A usability test was conducted with the objective to take a holistic look at the LEDITA system and gathering data concerning the process of creation of a learning design and the effectiveness of the LEDITA tool. Results from the study showed a good usability level and a consistent support to the reflection on teaching practice, especially in relation to the organization and management of knowledge and content. The main contribution of this tool is to highlight the possibility to overtake the perceived incompatibility between the support of design sharing and the encouragement of teaching reflection, by means of a participatory development process that connected educators and programmers in a flexible and tailored solution.

4 Conclusions

The contribution of this research relates to the field of Learning Design, defined as a design practice aimed to promote teaching and learning in the contemporary context. Design in order to promote the learning means consider epistemological knowledge, social interactions, physical resources and the space/time in order to model an educational action for a specific context. Designing in a formal and explicit way entails the production of an artifact, which, once completed its initial function of planning, becomes a documental resource of the educational action. In this evidence, it is possible to ground the experience, exchange and dialogue among peers and optimize time and resources for the design of future plans.

The main contributions of this work intertwine the theoretical level of understanding and development of the conceptual body and the practical level of implementation of the proposed solution. In detail, this path is articulated with the definition of the DAR3T design model, with the proposition of the LEDITA design approach and, finally, with the development of the LEDITA tool.

The DAR3T model allowed focusing on the design aspects related not only to the students and learning, but also to the teachers and the possibility to use the design for their professional growth. The reference to Schön's epistemology of practice also helped to link design to reflection, in and on action, as fundamental practice for cycle of design, use and reuse of a learning design. This first theoretical step has characterized the LEDITA project, basing it on the teaching practice and differentiating it from the scenario of current LD research, which is mainly inspired by the research for a formalization and a definition of a sufficiently expressive representational language, or by the use of principles and pedagogical theories to support and guide the teachers' design.

The basing on the teaching practice led to the definition of the LEDITA approach, characterized by reference to the teaching context as a support for the creation of a design. Refer to practice means to refer to unique events, characterized by the combination and the dialogue of the epistemological, physical, social and spatio-temporal spheres. The highlight of the context and of all the elements that compose it allowed then isolating and bringing out a dual characterization of design that, at the moment in which it is created, it becomes anticipation of the educational event and allows implementing the reflection-in-action. The

description of educational action and the proposition of didactic suggestions arising from the reflection-in-action, finally become the cornerstone on which to base the reuse and sharing of designs. From sharing experiences among peers or from the reflection on the educational action previously implemented, it is possible to start again for the adaptation and modification of the contextual coordinates needed to breathe new life into a learning design.

Finally, the development of LEDITA tool has actualized the conceptual framework, by focusing on flexibility and ease of use. The flexibility is reflected in the dual graphical and textual representation, in the possibility to define the scope of the design, in the opportunity to organize designs in a recursive manner, in the ease of organizing and editing activities, and in the possibility of using a design as a model by changing only the desired elements. Usability, instead, is found in all the elements of the software tool, going beyond ease of use and learnability and investing the understanding and meaning that the entire research path has focused in the implementation of the final solution. The achievement of good levels of usability and understanding of LEDITA tool by teachers has shown that the research path succeeded to make familiar the formalization and explicitness of the design practice, eliminating the elements of complexity and understanding that might undermine the dissemination and use by teachers. This result was favored by the close collaboration with teachers and the use of semio-participatory practices, which allowed to get closer to the reality of teaching and reveal the understanding of their practices, values, needs, difficulties and aspirations. In this manner, it was possible to overcome the dichotomy programmers / educators and achieve the balance necessary to the success of Educational Technology. Finally, the carried out work has responded positively to the initial research question through the definition of an approach and the implementation of a software tool close to teachers reality and able to promote the use and dissemination of LD between teachers non-specialist in design. Designing with the LEDITA tool also allows the development of competences and professional growth, through reflection-in-action and expansion of the didactic repertoire implemented at the design stage, and through the reflection-on-action and critical review of their professionalism, implemented by means of the sharing and adaptation of a design to a new context.

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