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Section I
Foundations and Theory

Chapter I
Commodity, Firmness, and Delight: *Four* Modes of Instructional Design Practice /
Brad Hokanson, Charles Miller, and Simon Hooper 1

This chapter is interactive, with surveys and reflective examinations of the reader's own work in instructional design. It examines instructional design using four professional models: manufacturer, engineer, architect and artist to help develop a broader understanding of the process of design. The values of the instructional design are also challenged, with the chapter examining the balance between utility and aesthetics, function and form. It concludes with a call for the instructional designer to work more as an artist, and offers tactics to encourage that change.

Chapter II
Translate to Communicate: Facilitating Client Understanding of Design Languages /
Jason K. McDonald 18

This chapter discusses how principles of natural language translation can help instructional designers communicate instructional design languages in ways more natural to their clients. It argues that instructional designers should focus more on the fundamental meanings they are attempting to communicate through their design languages than on the mechanics and style of those languages. This can lead designers to find representation methods that help their clients better understand design meanings than if designers only used the language conventions with which they were already familiar. The author's hope is that this contribution to the literature on instructional design languages will lead to new language conventions that help designers more easily communicate their intentions and plans to all those who have an interest in a design's overall success.

Chapter III
The Power of Design Drawing in Other Design Fields / *S. Todd Stubbs and Andrew S. Gibbons*..... 33

This chapter is a survey of the literature of design studies, where the various characteristics of a phenomenon called design drawing, are considered. Included in this review is an exploration of the roles and attributes design drawing plays in those design fields outside ID, as an important design language. Its importance to those design fields suggests that design drawing might have much to teach us about visual instructional design languages (VIDLs). In reviewing these attributes of design drawing and how they are implemented in those other fields of design, we hope to inspire a dialogue on how these important characteristics will aid in creating or nurturing VIDLs.

Chapter IV
The Culture Based Model: A Framework for Designers and Visual ID Languages /
Patricia A. Young 52

Globalizing the field of instructional design lies in the building and nurturing of innovative models, frameworks, visual languages, and practices that include culture based considerations. This chapter argues that culture, as a design construct, is integral to educating learners and enhancing the design process. This is supported by a review of theoretical and methodological studies that define culture and an examination of models of culture that are supported by VIDLs. Further, the significance of VIDLs as design tools is offered through the culture based model (CBM) an intercultural instructional design framework that guides designers through the management, design, development and assessment process while taking into account explicit culture based considerations. The chapter provides a description of the origins of CBM, an overview of relevant research, and an outline of the model and its possible applications with VIDLs. This research suggests that VIDLs can serve a broader scope if culture is considered.

Chapter V
The Virtue of Paper: Drawing as a Means to Innovation in Instructional Design /
Brad Hokanson 76

This chapter presents an argument in favor of using paper to conceive, plan, and describe instructional design projects. Such a simple medium has great capability and, as is well known, a tenacious ubiquity; our offices, practices, and lives are filled with paper. We will see how the attributes of paper help us in both social and cognitive ways, particularly as a medium for drawing.

Section II
Visual Instructional Design Languages

Chapter VI
Plotting a Learning Experience / *Patrick Parrish* 91

This chapter describes an informal visual notation system that can be used by instructional designers in conceptualizing a design for an aesthetic learning experience. It begins by making a case for the importance of aesthetics as a major consideration in designing instruction, distinguishing aesthetic experience from more narrow conceptions of art and aesthetics. Drawing parallels between learning experiences and other narratives, examples of several narrative diagrams used in planning and analyzing fictional narratives are examined. Borrowing strategies from these narrative diagrams, the chapter then proposes the use of engagement curves to help designers more fully consider the aesthetic experience of learners in the design phase of instruction. Several examples of the use of narrative diagrams to analyze existing instructional designs are provided, as well as a demonstration of how an instructional design educator might use a narrative diagram in planning a course on ID models.

Chapter VII
E²ML: A Tool for Sketching Instructional Designs / *Luca Botturi* 112

This chapter introduces E²ML, the educational environment modeling language. E²ML is a lightweight visual language for instructional design; suitable both for complex instructional design processes and simple paper and pencil sketches. E²ML can be used for visualizing the intermediate and final results of design, thus providing documentation in a shared language that can enhance team communication, improve design and contribute to the development of high-quality instruction. The language and its features and applications are presented through a case study, evaluation results are briefly reported, and critical issues are discussed.

Chapter VIII
The MOT+ Visual Language for Knowledge-Based Instructional Design /
Gilbert Paquette, Michel Léonard, and Karin Lundgren-Cayrol 133

This chapter states and explains that a learning design is the result of a knowledge engineering process where knowledge and competencies, learning design, media and delivery models are constructed in an integrated framework. Consequently, we present our MOT+ general graphical language and editor that help construct structured interrelated visual models. The MOT+LD editor is the newly added specialization of this editor for learning designs, producing IMS-LD compliant units of learning. The MOT+OWL editor is another specialization of the general visual language for knowledge and competency models based on the OWL specification. We situate both models within our taxonomy of knowledge models respectively as a multi-actor collaborative process and a domain theory. The association between these "content" models and learning design components is seen as the essential task in an instructional design methodology, to guide the construction of high quality learning environments.

Chapter IX
coUML: A Visual Language for Modeling Cooperative Environments /
Michael Derntl and Renate Motschnig-Pitrik 155

This chapter presents coUML, a visual modeling language for cooperative environments. As modern instructional environments have a highly cooperative nature, coUML is proposed as a powerful and effective language for modeling instructional designs in such environments. Being based on UML, it was conceived and refined through application and experience over multiple years, primarily in a cooperative blended learning environment. The chapter presents relevant requirements and applications that contributed to the development of coUML, as well as a detailed specification of model elements, characteristics and features that describe its current state.

Chapter X
poEML: A Separation-of-Concerns Proposal to Instructional Design /
Manuel Caeiro-Rodríguez 185

This chapter introduces a new visual educational modeling language (EML) based on a separation-of-concerns approach, PoEML: perspective-oriented EML. EMLs were proposed to support the modeling of educational units. These languages are related to ID, as they are intended to represent models of educational units. This chapter introduces the PoEML separation of concerns and its graphic constructs. The main idea underlying PoEML is to break down the modeling of educational units into separate parts that can be specified independently. PoEML is mainly focused on supporting the computational execution of educational unit models. In addition, the separation of concerns allows us to approach the modeling of educational units in an incremental way, offering advantages in expressiveness, formality, adaptability and flexibility.

Chapter XI
Performance Case Modeling / *Ian Douglas* 210

This chapter introduces performance case modeling as a means of conducting a performance analysis. It argues that the design of any instruction focused on practical subjects should be preceded by understanding of the performance requirements for graduates of a course of instruction. This understanding is facilitated by the collaborative creation of diagrams that identify the different roles a performer takes and their associated goals, together with documentation of performance measures for the goals. The measures serve as a baseline for the evaluation of instructional effectiveness. Other approaches to visual languages in instructional design have been more focused on modeling the architecture of the instructional system rather than the performance environment in which its graduates will be expected to perform. The approach described is based on UML use cases and serves to focus thinking on the performance analysis that should occur prior to the design of instruction.

Chapter XII
LDL for Collaborative Activities / *Christine Ferraris, Christian Martel, and Laurence Vignollet* ... 226

LDL (learning design language) is an educational modeling language which was conceived to model collaborative activities. It has roots in social sciences, mainly linguistics, sociology and ethnomethodology. It proposes seven concepts that allow instructional designers to build the model of a collaborative learning activity. It has both a visual and a textual notation, the latter being computer-readable. This means that the produced models can be easily operationalized and executed in an existing virtual learning environment. This chapter introduces LDL, its concepts and the graphical notations associated with each of them. The methodology proposed to facilitate the modeling is also presented. Its use is illustrated by the example of the planet game, which was practically tested with other research teams as a benchmark/competition during the ICALT 2006 conference.

Chapter XIII
Visual Design of Coherent Technology-Enhanced Learning Systems:
A Few Lessons Learned from CPM Language / *Thierry Nodenot, Pierre Laforcade, and Xavier Le Pallec* 254

Visual instructional design languages currently provide notations for representing the intermediate and final results of a knowledge engineering process. As some languages particularly focus on the formal representation of a learning design that can be transformed into machine interpretable code (i.e., IML-LD players), others have been developed to support the creativity of designers while exploring their problem-spaces and solutions.This chapter introduces CPM (computer problem-based metamodel), a visual language for the instructional design of problem-based learning (PBL) situations. On the one hand, CPM sketches of a PBL situation can improve communication within multidisciplinary ID teams; on the other hand, CPM blueprints can describe the functional components that a technology-enhanced learning (TEL) system should offer to support such a PBL situation.We first present the aims and the fundamentals of CPM language. Then, it analyzes CPM usability using a set of CPM diagrams produced in a case study in a 'real-world' setting.

Chapter XIV
Visual Modeling of Collaborative Learning Processes:
Uses, Desired Properties, and Approaches / *Andreas Harrer and H. Ulrich Hoppe* 281

The modelling of learning processes and its use in computer-supported learning scenarios attracted attention in a wide variety of research fields in the last years, e.g., in Web based education, computer supported collaboration scripts, and intelligent tutoring systems (ITS). Most of the discussion is either focused on the conceptual level of instructional design for exchange between designers or on the automated execution of predefined designs and learning scripts. This chapter elaborates on the whole spectrum of different uses that visual learning models provide for teachers, learners, and researchers. Based on our discussions in an international research project on computer-supported collaboration scripts we identify desired properties for such modeling languages especially considering the needs of the practitioners. Finally it proposes MoCoLADe (model for collaborative learning activity design), an exemplary approach of a visual language for collaborative learning processes that was designed according to the presented principles.

Chapter XV
Using the IMS Learning Design Notation for the Modeling and Delivery of Education / *Colin Tattersall, Tim Sodhi, Daniel Burgos, and Rob Koper* 299

IMS learning design (IMS-LD) is a notation system for learning and instruction. It supports the description of learning processes using a set of standardised concepts, including roles, activities, acts, objectives and prerequisites. With the availability of such a notation, descriptions of learning processes can be shared, critiqued, modified, rated, compared and evaluated. Moreover, the machine-interpretable nature of the notation means that designs can be executed by software to support the dynamic orchestration of multi-learner, multi-role learning processes. This chapter introduces IMS-LD and describes experience with its use, supported by the first generation of tooling. We then combine these experiences with observations on the tools in the light of new developments in e-learning in order to derive a set of requirements for IMS-LD enabled visual design environments.

Chapter XVI
Comparing Visual Instructional Design Languages: A Case Study / *Luca Botturi, Daniel Burgos, Manuel Caeiro-Rodríguez, Michael Derntl, Rob Koper, Patrick Parrish, Tim Sodhi, and Colin Tattersal* 315

This handbook testifies that research on VIDL is lively, and has produced a number of interesting design languages and tools. This chapter wants to support readers in understanding the similarities and differences of some of the VIDL presented in the previous chapters, not in theory, but applying them to a specific instructional design case.

Section III
Research Studies

Chapter XVII
The Pervasiveness of Design Drawing in ID / *S. Todd Stubbs and Andrew S. Gibbons* 345

This chapter is a survey of the literature of ID to look at the breadth and usage of design drawings in this discipline to better understand the emerging use of VIDLs to improve designs. To conduct this research, the authors sampled several ID textbooks, ID journals, software, and case studies looking for examples of design drawing. Design drawings found were then categorized using Gibbons' (2003) seven ID layers as a taxonomy to understand the drawings purposes. The authors did not find the same pervasiveness or level of self-awareness as found in other design fields. Examples of design drawings were found, but were somewhat rare. Furthermore, they discovered that those examples we found tended to document only two of Gibbons' seven layers, indicating narrow application. They believe this gap represents a serious shortcoming in ID, indicating a lack of tradition, skill, and standards for visual representations of design except in limited ways. At present, design drawing is a rare but growing phenomenon in ID, which, when fully understood and implemented, can only benefit the practice of ID.

Chapter XVIII
Lost in Translation: Improving the Transition Between Design and Production of Instructional Software / *Eddy Boot, Jon Nelson, and Daniela De Faveri* 366

Developing modern instructional software has become very complex. As a result, the communication between instructional designers and other stakeholders in the development process is becoming increasingly important. However, due to differences in background, focus, and tools among ISD stakeholders, instructional designers lack the means to provide reasonably unequivocal design documentation for these stakeholders. These differences in stakeholders create a context where the design documents produced are not sufficiently related to the specific needs of the stakeholders, in terms of meaningful organization and differentiation of level of detail. This problem is complicated by the lack of shared design languages. These problems prevent precise expression of design information. The 3D-model is introduced to support instructional designers to stratify, elaborate, and formalize design documents, even if design languages are hardly shared between designers and other stakeholders. Two validation studies show that the 3D-model contributes to a better information transition between instructional designers and software producers—one of the stakeholders in the development process.

Chapter XIX
A Visual Learning Design Representation to Facilitate Dissemination and Reuse of Innovative Pedagogical Strategies in University Teaching / *Shirley Agostinho, Barry Harper, Ron Oliver, John Hedberg, and Sandra Wills* 380

This chapter describes a visual learning design representation devised in an Australian funded project that focused on identifying and describing innovative educational practices employing the use of information and communication technologies (ICT). Referred to as learning designs project (www.learningdesigns.uow.edu.au), the aim was to produce generic learning design resources and tools to help academics in higher education implement innovative ICT-based learning designs in their own teaching contexts. The chapter describes the learning designs project, details how and why the graphical learning design representation was created and provides an example to illustrate the visual formalism. How the authors have built on this work since the completion of the project is also discussed. The purpose of this chapter is to explain how this visual representation works so as to inform teachers and educational researchers of its potential to serve as a common language to describe learning designs.

Chapter XX
Diagrams of Learning Flow Patterns' Solutions as Visual Representations of Refinable IMS Learning Design Templates / *Davinia Hernández-Leo, Eloy D. Villasclaras-Fernández, Juan I. Asensio-Pérez, and Yannis Dimitriadis* 394

This chapter introduces the use of diagrammatic representations of learning flow patterns as a means of visualizing refinable IMS learning design (IMS LD) templates. It argues that the incorporation of pattern-based IMS LD templates in authoring tools, which graphically guide users to create their own learning designs, offers a solution to the problem of IMS LD constructs not being familiar to educators because of its technical nature and text-based notation. Furthermore, this solution facilitates the reuse of good practices formulated as patterns, permitting a design process that promotes potentially effective results.

This issue is especially important in collaborative learning designs, in which elicitations of desired social interactions are planned beforehand. Based on these ideas, the chapter also presents Collage, an IMS LD editor which provides templates based on collaborative learning flow patterns (CLFPs), and includes an example drawn from a real scenario that show the feasibility and usefulness of the approach.

Chapter XXI
Designing for Change: Visual Design Tools to Support Process Change in Education /
John Casey, Kevin Brosnan, Wolfgang Greller Alan Masson,
Aine MacNeill, and Colette Murphy 413

This chapter looks at the possible uses of visual forms of instructional design (ID) languages as possible 'change agents' for design practice in the public post-secondary education sector. A lot of work is being done in the technical realm of the standardization and interoperability for educational modeling languages (EMLs), but this is largely restricted to existing ID specialists that use 'dialects' of ID languages and schemes. This is important work but it does not address the vast majority of educators working in the postsecondary public educational sector whose design work is highly individualised and deeply embedded in rich institutional contexts. The challenge for visual ID languages and EMLs in general is how they can move beyond their current specialist niche applications to be useful to mainstream educators. In this chapter we argue that this development needs to happen along two related dimensions: (i) changes in the organization of the educational workplace and related training—what might be termed 'push factors'; and, (ii) the use of tools such as visual ID languages to support that change process at individual and group levels—what might be termed 'pull' factors. We shall be concentrating on this second dimension. Specifically, in this chapter we shall be looking at ideas for how we might apply visual ID languages as a support mechanism in helping educators externalize and share their design models and ideas in order to develop them into semi-formal abstractions that might be developed to feed into the use of EMLs. To ground these ideas, we shall be looking at the experiences of those who have tried these types of approaches in practice. Finally we discuss the effect this type of perspective might have on the future development of visual ID languages and related tools.

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