Seoane Pardo, A. M., & García-Peñalvo, F. J. (2014). Pedagogical Patterns and Online Teaching. In F. J. García-Peñalvo & A. M. Seoane Pardo (Eds.), *Online Tutor 2.0: Methodologies and Case Studies for Successful Learning* (pp. 298-316). Hershey, PA: IGI Global.

Pedagogical Patterns and Online Teaching

Antonio Miguel Seoane-Pardo[1] and Francisco José García-Peñalvo [2]
[1] GRupo de Investigación en InterAcción y eLearning (GRIAL), Research Institute for Educational Sciences, University of Salamanca, Spain.

[2] Computer Science Department, University of Salamanca, Spain.

{aseoane, fgarcia@usal.es}

Abstract: This outcome summarizes the experience collected after years of researching and experiencing on teaching and learning online in the form of an eLearning pattern-architecture. In this architecture, based upon the leading role of the human factor (according to the vision of the eLearning by GRIAL Group), the whole processes occurring within any training activity will be represented, from the institutional planning to the evaluation of the whole process, technological decisions, teaching activity and interaction with students, etc. This model will be briefly presented after the explanation of the notion of *pattern* (and its application to the pedagogical context), as a prerequisite for understanding the scope of the use of this methodology in the field of online training

1. Introduction

The concept of *pattern* does not come from the educational context and its most productive implementation sphere is probably Computer Engineering, particularly areas related to the planning and development of software applications. Patterns have interesting uses in other business and industrial spheres, and only in the last years the concept of *pedagogical patterns*, as an attempt to apply this method of successful solutions representation to the scope of education, has made a space for itself in the scientific literature. Despite the attempts to add its benefits to the *educational culture*, its use and result perhaps are not at the height of the potential benefits that could be pulled out of its employment.

Certainly, the *pedagogical patterns* implementation to *eLearning* cannot be considered one *off-topic*, but it is enough to go to any relevant event of pedagogical nature or even about *eLearning* to check it isn´t among the *trending topics* either, and generally, you have to pore over the events and publications specifically devoted to patterns to find some literature and cases about the use of pedagogical patterns. Anyway, in this research it has been considered that its use makes it possible to represent in an optimal way both the pattern and the experience gathered by the GRIAL group along the last few years.

2. The concept of *pattern* and its applications

The concept of *pattern* is by no means something recent. Moreover, strictly speaking, it is not even necessarily a human invention. There is a huge number of *patterns,* that is, particular solutions which enable a potentially infinite number of variations to happen. A beehive is the result of a repeating *pattern,* basically of one sole element: hexagonal cells. However, there are not two identical beehives: Each of the elements

in the periodic table is also a *pattern* (Fuller & Applewhite, 1975). Regarding human beings, they have been using *patterns* for centuries in the artistic creation, in science[1] [1] and, of course, in the textile manufacture, whose context the best known Spanish meaning of the word belongs to.

Nevertheless, the technical sense of the word we are interested in here, comes from, and it is well known, the architect Christopher Alexander, who, in his work *A Pattern Language. Towns, Buildings, Construction,* states that a *pattern "describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice"* (Alexander, Ishikawa, & Silverstein, 1977, p. x). In *The Timeless Way of Building,* Alexander defines the *pattern* again referring to the three elements that make it up. Thus, *"each pattern is a relationship between a certain context, a certain system of forces which occurs repeatedly in that context, and a certain spatial configuration which allows these forces to resolve themselves"* (Alexander, 1979, p. 247). So, in a particular *context* a *problem* happens, and a *solution* is provided. The relationship among these three elements makes up a pattern. So, a pattern is not a simple "answer key", because it is not complete if the problem and the correct context for which such solution states to be efficient is not explained. Therefore, Alexander points out, just after the previous assertion, that "*The pattern is, in short, at the same time a thing, which happens in the world, and the rule which tells us how to create that thing, and when we must create it. It is both a process and a thing; both a description of a thing which is alive, and a description of the process which will generate that thing".*

In *A Pattern Language*, Alexander makes a catalogue of 253 patterns ordered and numbered from the greatest organic complexity (the city) going through its components (buildings) and the simplest solutions for such buildings (construction). This *Pattern language,* we will write about further on, receives the direct influence of the design and computer programming language which was being developed in that moment and that's why he states this language has got a network structure. And this, probably, explains why the leap of patterns from Architecture to Computer Engineering turned out to be so extremely natural.

Alexander's formula gets a rather discreet reception in its field of origin, architecture, but it is also used in Natural Sciences, Mathematics and even in Social Sciences. However, where it finds its *natural* development field is in Computer Science. In 1987 Kent Beck y Ward Cunningham present a report where they adapt Alexander's language of pattern to programming directed to objects. And from there it comes the first definition of "programming pattern": *"A pattern language guides a designer by providing workable solutions to all of the problems known to arise in the course of design. It is a sequence of bits of knowledge written in a style and arranged in an order which leads a designer to ask (and answer) the right questions at the right time"* (Beck & Cunningham, 1987).

But patterns in Computer Science were not successful until the 90s with the publication of the work *Design Patterns*, by the group known as GoF (*Gang of Four*).

[1] In fact, Mathematics is considered by many people to be the "Pattern Science" whose structures repeat in the Nature. From there, the sense of Galileo's sentence: *"The great book of Nature is written in mathematical symbols".*

The definition of design patterns that appears in this work keeps intact the spirit of the original, with the natural technical attachments. Gamma and his collaborators define them as *"descriptions of communicating objects and classes that are customized to solve a general design problem in a particular context"* (Gamma, Helm, Johnson, & Vlissides, 1994, p. 3). Two years later, this work is followed by *Pattern-Oriented Software Architecture. A System of Patterns*, by Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad and Michael Stal, also known as *Gang of Five*. Buschmann states that a pattern of *software* architecture *"describes a particular recurring design problem that arises in specific design contexts, and presents a well-proven generic scheme for its solution. The solution scheme is specified by describing its constituent components, their responsibilities and relationships, and the ways in which they collaborate"* (Buschmann, Meunier, Rohnert, Sommerlad, & Stal, 1996, p. 8).

Patterns in Computer Science provide with agile solution models for the recurring problems of software design, both in *software* engineering and in *Human-Computer-Interaction,* fields where its use is more common. In fact, besides *Architecture Patterns* and *Design Patterns*, *Patterns of Design of Interaction* (Norman & Draper, 1986, sugiere la aplicación de patrones a HCI) and *Organization Patterns*[2] (Coplien & Harrison, 2004), are also mentioned among others.

Alexander's pattern dynamics has been reproduced and adapted to many other fields. However, the concept of *Pedagogical Pattern* or *Learning Pattern,* which will be developed, further on, deserves special attention in this research. Since mid-20th century multiple applications to as many aspects related to learning from the design of courses and contents to interaction in virtual environments or mechanisms for task distribution have been developed half way between Alexander's model and computer design patterns, just to mention some examples. One of the canonical characterizations of learning design pattern (or pedagogical pattern) is that offered by Yishay Mor y Niall Winters: "*a design pattern is a semi-structured description of an expert's method for solving a recurrent problem, which includes a description of the problem itself and the context in which the method is applicable […]. Design patterns have the explicit aim of externalizing knowledge to allow accumulation and generalization of solutions and to allow all members of a community or design group to participate in discussions relating to the design* (Mor & Winters, 2007).

3. Typology and pattern categories

As it has already been stated, a taxonomy of patterns which goes from broader or general, the organization of cities, to the simplest constructive solutions: doors, windows, lightning, etc., is made in Alexander's model. Beyond this classification, Alexander doesn´t establish any typology which enables to order or structure these patterns, in part because in the scope of knowledge it is applied, architecture, the order of solutions and their placing in a context, in this case, spatial and physical turns out to be *naturally* intuitive.

[2] Curiously, organization patterns have their raison d'être in the context of business knowledge management as elements to stimulate corporate memory; however they have decisively influenced in the so-called *Agile Software Development Movement*, and especially in the agile programming methodologies known as *Extreme Programming* and *Scrum*.

Other different thing happens when the model is exported to Computer Science. Erich Gamma and his collaborators understand that design patterns differ among them both because of their *granularity* and their *abstraction* level. Since the catalogue of the starting 23 is already wide enough and the model will probably continue to grow, it is necessary to find a way to organize them into related pattern *families,* with the purpose of easing their learning, as well as the creation and placing of some new other ones. GoF decide to classify patterns by means of two criteria, the aim (*purpose*) and the field of application (*scope*). According to their purpose, patterns can be *creational,* when the goal is the creation of objects, *structural*, when they are linked to the composition of object classes, or *behavioral,* if they define the ways in which these classes or objects relate among them. According to the scope, patterns can mainly refer to *classes* or to *objects*. The *class patterns* refer to the links among classes and their corresponding subclasses. *The object patterns* refer to the links among objects which are more dynamic and flexible than those established among classes. Besides, they add, some patterns are intended to be used together; some others are variations which share the same structure but with different goals and, finally, other way of organization consists of setting up references and links among the different patterns (Gamma, Helm, Johnson, & Vlissides, 1994, p. 10).

Frank Buschmann and his team agree with GoF about patterns have different levels of scale and abstraction. Some of these patterns contribute to structure a *software* system into subsystems, while others ease the subsystems and their components refinement, or that of the links that exist among them. Finally, there are patterns that provide help to implement particular aspects of design in a specific programming language. Moreover, all these patterns vary due to their more generic or specific nature. (Buschmann, Meunier, Rohnert, Sommerlad, & Stal, 1996, p. 24). Nevertheless, instead of GoF model they decide to establish three pattern categories, according to their abstraction level. Firstly, there are the *Architectural Patterns,* whose function is *"express fundamental structural organization schemas for software systems. They provide a set of predefined subsystems, specify their responsibilities, and include rules and guidelines for organizing the relationships between them"* (p. 25) Secondly, the design patterns describe *"a commonly-recurring structure of communicating components that solve a general design problem in a particular context"* (p. 221). Finally, The Idioms are *"low-level patterns specific to a programming language. An idiom describes how to implement particular aspects of components of the relationships between them with the features of the given language"* (p. 345). Therefore, architectural patterns establish the fundamental elements of the system architecture, with the corresponding subsystems and their main components along with the links that are established among them. Design patterns describe the communication flows that happen among the system components for their application to specific contexts.

Finally, the idioms represent particular solutions and ways to implement each of the elements, which make up the structure in situations with specific characteristics.

Despite these classifications, and although it is commonly acknowledged that patterns show all the differences identified by the authors of these recently mentioned works, it is certain that the most used concept, not only in Computer Science but also in other subjects, is the design pattern. A great number of experiences and usage cases of patterns use this definition as a basis, probably following the GoF tendency, which

already referred to these elements as *Design Patterns.* Particularly in the field of pedagogical patterns or learning patterns this definition is mostly used in expressions like "pedagogical design patterns", "patterns of pedagogical design", "learning design patterns" and the like; it is very difficult, almost impossible if it could be said, to find references to "patterns of learning architecture" or "Pedagogical patterns of architecture", and the same happens to the Buschmann definition for "Idioms".

As a general rule, the different pattern granularity and abstraction, as well as their dependencies, are usually graphically represented by means of pattern maps, in such a way that *syntactically* all the patterns keep their integrity while *semantically,* the links and dependencies, the context and the sense of each pattern are well seen due to their position in the flowchart.

4. Languages of pattern and structure

The concept of language of pattern is linked since its origin to the method devised by Christopher Alexander, who says that patterns are elements which make up a language, understood as a network where no possible sequence of patterns is able to "catch it" completely, although it does make up a kind of summary of it, and simultaneously, an index of the group as well. (Alexander, Ishikawa, & Silverstein, 1977, p. p. xviii) A little more accurate, two years later he defines the language of patter as *"a finite system of rules which a person can use to generate an infinite variety of different buildings"*. But declaring that a particular group of patterns (organized in a certain way) makes up a language of patterns turns out to be a bit too unspecific to begin with.

As any language (formal or not), a language of pattern is a structured system which consists of grammatical rules[3] of morphological, semantic and syntactic nature (since it has no sense to speak about either the phonetic-phonological dimensions or perhaps about pragmatics[4], which are the other elements that make up Grammar) that respectively explain how their components are created, what meaning they have and how they link among them.

That is the reason why we can understand that a group of patterns, as long as they share the same grammar, make up a *language of pattern,* as Alexander defends, where all the patterns form their *vocabulary* (Buschmann, Meunier, Rohnert, Sommerlad, &

[3] Miguel Zapata (Zapata Ros, 2011) has explained the concept of language pattern using a terminology similar to the one used here but perhaps a bit unspecific. This author considers a language of pattern is made up of vocabulary, syntax, and grammar, an index of links among terms and a network of links in the index of the language. In this work we have preferred to use an easier and more coherent explanation with the concepts of "grammar", "syntax" and "semantics" accepted both by Linguistics and Mathematical Logics. Patterns have a structure (a morphology). The way the can connect with other patterns, as well as the rest of possible component interactions inside the language of pattern are stated through syntactic nature rules. Finally, semantics comes both through the meaning of patterns (vocabulary or *lexicon*) and the *model* or structured set which lets the formal statements make sense (since here, semantics is applied to a logical system).

[4] Though it may seem a bit complex, to the extent that a pattern itself can have different meanings, either because it is applied in other contexts or because its sense could be modified due to its relationship with other patterns, perhaps it will make sense to talk about a *pragmatic dimension* of language of patterns which, as in the case of natural language, would depend on the *context* and *situation.*

Stal, 1996, p. 6).The organizative structure of the languages of pattern, with their hierarchies, dependencies, and repetitions, is left at each designer's discretion, providing a flexible and very versatile model. However, the return which is immediately perceived is that there is not a commonly accepted *standard*, especially regarding to pedagogical patterns, which makes its reusability and scalability very difficult. It is true that they share common aspects and that it is rather easy to adapt the structure of patterns coming from different contexts, since somehow all of them are developments, to a greater or lesser degree of detail, from Alexander's model. It is to say, the *vocabulary* could be *translated* into different languages.Nevertheless, this possibility seems to be insufficient, as it is to try to understand an unknown language simply with the help of a dictionary.It is necessary that, besides vocabulary, all the other grammar and language rules can be translated as well, which is not so easy.

Therefore, at least in the pedagogical field, it is not easy to export patterns with their corresponding dependencies to other contexts, because the different languages of pattern which are developed work equally with elements of very different granularity and abstraction level and they establish links among patterns which are also unalike among them.

The language of pattern makes up a method to collect knowledge and best practices experiences through a coherent structure that enables the user to identify the most usual problems and find solutions to them, in a non-deterministic and scalable way. It is to say, it has nothing to do with a set of "closed" instructions, but the way to imagination of the person who implements is left open, enabling therefore the development of new patterns, both inside this same language and through the creation of another different one.

Regarding the structure of patterns, it should be coherent and steady so that they can be easily reused and studied. All the existing models meet the requirements Alexander had defined: a pattern with a definite *name* can be applied in a particular context where a series of *forces* (*or* conditionings) that are balanced up by a solution are produced. However these models have gradually been getting formalized and sophisticated, adopting more complex structures like the ones which will be described further on. As an example, some authors claim that to build a pedagogical pattern of design linked to a definite competence nine aspects can be potentially taken into account (Weisburgh, 2004): The *name,* the definition of a particular *problem,* the *context* where such problem may happen, the *forces* or conditionings which provoke it, the *solution*, possible *examples*, the resulting *context* which will be achieved after the implementation of the solution, the *foundation* and the eventual *related patterns.* So, Mitchell Weisburgh states, the building of a pattern is reasoned as follows: *"If I find myself in some* Context *like* Examples*, and I face this* Problem*, with these* Forces *or constraints, but my situation is different from these* Related Patterns. *Then I should think like this* Rationale. *If I want this* Resulting Context *then I should follow this* Solution. *And here is a* Name *to help me remember this scenario".* The processes for the creation of patterns in every context (either pedagogical or not) are lead by a similar reasoning to the one described before.

As it has been seen there is not a *generic* grammar for the creation of languages of pattern. Nevertheless, the different structure models and pattern templates do show important similarities among them, with which, a priori, the establishment of a

common vocabulary seems to be viable. All the models have their origin in Alexander's patterns and keep closely the purpose of describing a context where a problem happens and for which a solution is offered, as it has just been indicated.

5. Pedagogical patterns

As it was indicated in the previous pages, the notion of pattern, which turns out to be a successful formula in certain Computer Science fields, has also its effects in Learning Sciences. Under denominations such as *pedagogical patterns, learning patterns, pedagogical design patterns or learning design patterns,* the idea has bashfully been added to the *culture* of educational planning. First of all, such adding has happened more easily in those *border* spaces between technology and education, in such a way that it is more frequent to find the use of patterns among experts who are devoted to Educational Technology. On the other hand, certain formative processes which require complex strategies to work properly, such as group dynamics o the seminar learning model (workshops) are also susceptible to be *made into patterns*. Finally. In *eLearning*, borderline par excellence among technological formation, knowledge management, interaction, etc., there are enough examples of the use of learning patterns. In online formation there are enough meeting points among fields of very different kind, with their respective methodologies and epistemological rules, idiosyncrasies, etc.; therefore, the implementation of the pattern methodology in this scenario can provide a good instrument for all the aspects which take part in the formative process to squeeze all their possible synergies to the limit for the sake of a greater formation quality.

5.1 Concept of pedagogical pattern

In a simple and initial approach, the concept of pedagogical pattern and its variations is an application of pattern methodology for the solution of problems related to formation. It is, that the definitions given before for the terms "pattern" or "design pattern" are perfectly acceptable for his context, changing the references to Architecture or the programming for those of educational nature (Rodríguez Jiménez, 2009). Actually, a more or less "canonical" definition could be as follows: *"a design pattern is a semi-structured description of an expert's method for solving a recurrent problem, which includes a description of the problem itself and the context in which the method is applicable […]. Design patterns have the explicit aim of externalizing knowledge to allow accumulation and generalization of solutions and to allow all members of a community or design group to participate in discussions relating to the design* (Mor & Winters, 2007).

Besides Mor and Winters definition, in *The Pedagogical Patterns Project,* another one is exposed, halfway through a characterization and an authentic declaration of intent, on which it is worth stopping for a moment. According to these authors *"pedagogical patterns try to capture expert knowledge of the practice of teaching and learning. The intent is to capture the essence of the practice in a compact form that can be easily communicated to those who need the knowledge. Presenting this information in a coherent and accessible form can mean the difference between every new instructor needing to relearn what is known by senior faculty and easy transference of knowledge of teaching within the community"* (Bergin *et al.*, s. d.). It

is certain that it becomes a bit separated from the traditional definition, since, more than indicating what the pedagogical patterns are, in these lines it is described what they are for and what are the main problems they try to solve. But the interesting thing is that some peculiarities regarding the applied patterns to other fields of knowledge are shown here, as the case of the computer programming languages. They are discussed next.

First of all, it is clear that the knowledge which is intended to place on the patterns is difficult to gather "*Capturing the expert knowledge*", when this is based on "*the learning and teaching practice*", is not an easy task. The teaching and learning strategies cannot be formalized as a brilliant solution to a problem, which substantiates into a programming code. Besides, it is relatively easy to check that the solution given by a programming design pattern works repeating it over and over again, while in education there are many variables, which can change the result of the repetition in each case of success. It is a possibility that should always be taken into account.

Secondly, the pedagogical patterns should capture "*the essence of the practice*" in a short but structured way. It is an extraordinary challenge. Is it possible to summarize the keys for a teacher to get good communication skills through a few pages? And, what is more important, supposing it is possible. Will the reading and studying of these solutions turn the recipient easily into a good communicator? Obviously, there are some skills that are easier to turn into patterns than others. But this does not mean it is not worth documenting the keys for success. And this is exactly what it is all about.

Thirdly, as it has just been exposed, it is worth trying to compile the good practices, though it is not easy or its functioning cannot be guaranteed in an unanswerable way, because educational patterns fulfill a double function: first of all, they demand, on the part of who elaborates them, a thoughtful effort not only aimed at "to teach properly", but to try to synthesize what are the keys of that successful activity which are worth being compiled as value experiences for third parties. Firstly, this task forces the author to think about the teaching process itself and enables to discover the elements which perhaps, with daily practice, could be unnoticed, resulting in the improvement of the teacher him/herself. It is important "to do something properly", but it is still much better "to know why it is done properly". Secondly (and this appears explicitly in the definition), this task enables to optimize the effort of *training* or *mentoring* others, as long as it contributes to structure the essential elements of the success strategies which will save time in learning by trial/error or by imitating other models. If the success patterns are formalized, the acquisition process of good practices will get accelerated and simplified. Following the business knowledge management model, the consideration which leads to the development of pedagogical patterns can be guided by any assumption similar to this: *"If I left my place and somebody had to stand in for me immediately, what is what I know and what would be useful for him/her to know to do his/her task properly or to avoid the mistakes I have made?"* Obviously, we cannot hide that all that glitters is not gold but the element of critical nature will be tackled later on.

Regarding the advantages of the use of patterns for their application to training, and though they don't differ significantly from those which can be noticed in other fields (Martínez García, 2009) it is worth underlining some of them next:

- Pedagogical patterns enable to create a *barn of ideas* made up with strategies and successful solutions for particular problems, properly documented with its corresponding contexts.
- They make up a reusable knowledge basis with an easy access and enquiry.
- They build a catalogue of suggestions, not prescriptions, with the possibility of being improved, modified or complemented with alternative solutions.
- They ease the knowledge transmission and the learning of good practices on the part of the users.
- They let the view, analysis and study of complex situations, through the development of languages of patterns, which enable their observation from multiple perspectives, both of generic nature and in detail, examining the simplest elements in the proposed scenario.
- They encourage the reflection about the processes that take part in learning, contributing to the search of successful formula and to the formalization of those that have shown to be efficient.

- They contribute to give a strategic value to the knowledge management on the part of the institutions, which encourage their development and store such knowledge.
- They promote the educational innovation culture and the concern about training processes quality.

Regarding the possibilities of the pedagogical patterns application to the teaching processes, it is not easy to define a suitable sphere of action, because they could be created for any type of activity or process. Actually, patterns for the planning of training initiatives can be developed, educational contents production, the establishment of workflows (among professionals or for their use on the part of students), educational strategies and teaching methodologies, use of technological resources, interaction dynamics, activities organization, assessment techniques, quality plans development, etc.

However, if there is a field inside training where the use of patterns can be especially recommended it is particularly in *eLearning*. It is a kind of training *bordering* formation, technology, knowledge management, organizational processes, etc., as it has been stated some paragraphs before. Contrary to what usually happens in conventional training processes, where it is not easy to persuade the professional of documenting his/her successful cases [5], in online training a great number of professional profiles with differentiated tasks (responsible for training, instructive designers, teachers, content producers, system administrators, etc.) take part and their work and collaboration is essential for the proper functioning of the initiative. Due to the heterogeneity and necessary coexistence of these profiles, many of which, are part of group work between pairs, the possibilities to compile the good practices in a

[5] Usually, the teacher considers he works *alone* and, consequently, he has not a stimulus to transmit his/her knowledge to others, since, generally, his/her task consists on teaching and not on teaching others how to teach. Therefore, he/she understands it is an effort that does not revert to his professional task.

coherent and structured way, if it were possible even by the development of a language of pattern where all the processes could be reflected, would give a *plus* of efficiency which would contribute decisively to improve the quality of the processes.

Indeed, cases of success linked to instructive design, *online* tutoring or the strategies of the use of virtual campus tools (Rodríguez Jiménez, 2009, p. 12) are capable of being represented by means of *eLearning* patterns. But they are not the only fields where they can be applied. Thus, over the last few years online training gives a new boost to learning pattern development, from now on *eLearning pedagogical patterns*, or, simply, *eLearning patterns*.

6. Language of pattern for GRIAL *eLearning*

The language of pattern that is presented in these pages is the result of the experience gathered by the GRoup of Investigation in InterAction and eLearning for over 10 years of training (Seoane Pardo & García Peñalvo, 2006a; Seoane Pardo & García Peñalvo, 2006b, 2008a, 2008b). During this period 4,257 receivers (students, teachers, and workers) have been trained in 142 Degree and Post degree initiatives, continuous and on demand training, both in the context of greater or lesser duration and in fields both academic and professional, for a total of 20,302 hours of training. Besides it has been tried and applied in different institutional contexts, from the University of Salamanca (with this proposal the present technical and human infrastructure of the Virtual University was developed. This is a service which provides more than 60,000 users with support) to other academic institutions (University of Burgos-Spain-University of Sonora-Mexico) or the Spanish Army, thanks to the collaboration with the Logistics Academy of Calatayud.

The main thesis is that this model, with its necessary modifications, can potentially be applied to any type of institution that develops virtual training independently of the *view* of *eLearning* it has. The patterns which lie beneath each of the elements that are observed in the language of pattern in Figure 1 are not going to be shown in these pages, since it would be very large, but the language of pattern itself will be explained so that the main problems to be faced by any institution which produces online formation, it does not matter if it is a university, a public administration or a company. Following Buschmann model, which has been described in detail before, the GRIAL language of pattern takes into account three levels of concretion in the development of the online training initiatives. Firstly, the model *architecture* (represented in the figure 1 by five ellipses whose denominations are preceded by the letter "A" followed by a number) includes all the elements that any institution should take into account for the development of online training, namely: the strategic plan (*A1. Course Prep,* see figure 2), the instruction planning (*A2. Unit plan,* see figure 3), the teaching action (*A3. Tutoring*, see figure 4), the formative adjustments (*A4. Settings*, see figure 5) and the assessment (A5. *Evaluation*, see figure 6). Each institution can define its strategy related to the way each of these elements is conceived, but its presence becomes absolutely unavoidable in any virtual teaching model. On the other hand, a second level of this model corresponds to *Design,* it is, the elements where each of these architectural elements are made clear enabling to develop the *view* of each of them. These design elements, shown in the figure 1 by means of rectangles whose names are preceded by the letter "D" followed by a number, intend to include all the problems or

possible drawbacks related to the defined architectural elements which are faced by the institution, and those which should face with a suitable solution in their context. In the GRIAL model a total of 27 design elements have been identified, linked to some of the 5 architectural components previously defined. Finally, these design elements have been solved through specific solutions or low-level patterns called dialects or *Idioms.* Such *idioms* make up the specific answers that an institution offers to the design problems that want to solve inside an architecture of their "*concept*" of *eLearning.*

In the model which is shown, the idioms are not necessarily exportable solutions, since, depending on the type of institution and on the architectural and design model of its virtual teaching strategy, these solutions, based on the concept of *eLearning* supported by the importance of the human factor which is claimed by GRIAL, will be able to be more or less suitable. Thus, if from the point of view of the institution which "uses" the idioms model they make up the most useful part, because they conform the solution to particular problems inside a model which is shared and known, from the point of view of an institution that considers "*to import*" a language of patterns into its concept of *eLearning* they are of less importance because it should be known which design elements build up its architecture and how to define its "concept" of virtual teaching. Only when this task has been developed (not minor at all) and enough experience has been accumulated so as to build "tailor-made" solutions for their necessities (tailor-made but flexible at the same time, since patterns are not protocols to be applied in a *non-critic* way) it is ready to define the language of pattern up to the smallest detail.

Due to the necessary shortness of this work, and in order to simplify the model explanation or the GRIAL language of pattern, Table 1 shows what each of the elements of the Architecture and Design language of this language of pattern consists on, is shown in the shortest possible way.

Reference pattern	Definition
A1. *Course Preparation*	In this architectural element all the necessary design patterns fit in order to integrate the *eLearning* strategic aspects of the institution. The *model* or *view* of the eLearning that will be explained next is defined here.
D1. *eLearning Model*	The *view* of the institution is defined (I1) and the rules for the scenarios that are going to be faced are clearly established (I2). The type of student that is going to be encouraged is also defined (I3) so as to know if it fits *"our"* model.
D2. *Technological Ecosystem*	The strategic decisions leading to provide the institution with the necessary tools to develop the *eLearning* model previously described are made here.
D3. *Incoming Competencies Scenarios*	The strategies and instruments for the analysis of the incoming competencies of the students are defined here, as well as the mechanisms to balance possible differences, in order to guarantee they could reach the outcoming competencies the training initiatives promote.
D4. *Outgoing competencies*	A competency catalogue for the institution and for its training initiatives, which both the instructive designs and the activities to be developed in the training procedures will be functional to, is defined here.
D5. *General Assessment Plan*	A general plan of assessment is evaluated and the general

	tools and strategies which all the teachers will be able to apply according to the established *eLearning* model is defined here.
D6. *Instructional design*	An instructional general design is defined; a structure to which all the training actions ought to approach, with the aim of giving homogeneity and transparency to the educational strategies.
D7. *Unit(s) Design*	Models or templates for the development of educational units and modules are carried out so that the teachers can find easy to plan the educational activity.
D8. *Content Development*	It is defined whether it is necessary to provide the institution contents with a standard structure, and if that is the case, the required models for its production are given.
D9. *Demography*	The strategies and instruments to gather information about the main demographic indicators of the students are defined.
A2. *Unit Plan*	In this architectural element the main elements for the educational intervention planning or the instructional design of the particular training activities are defined.
D10. *Activity Plan*	The working and developing model for the activities on the part of the students is defined so that it can be applied in the educational intervention units in question.
D11. *Didactic Strategies*	The didactic strategies in compliance with the competency types, which are going to be acquired through the training intervention, are made clear with enough variety and richness so as to ease the best possible kind of learning.
D12. *Assessment Strategies*	The main assessment strategies that are going to be applied in the training initiative are defined.
D13. *Technological Strategies*	The set of tools that will be necessary for the development of the training activities in the particular initiative is defined.
A3. *Tutoring*	In this architectural element the teaching profile functions are defined both in the particular initiative and, if appropriate, from an institutional viewpoint. The design elements that are included in this architectural component are considered to be functional to a view of *eLearning* based on the importance of the human factor and on the strong teaching presence.
D14. *Introducing*	It is very important to show and give precise guidelines for the development of the activities and the course. This pattern defines the strategies to perform such a task in an efficient way.
D15. *Task Sharing*	It is considered essential that the teacher outlines a model for the distribution of the tasks, which can vary from the development of individual activities to different group work dynamics. This pattern defines the strategies to perform such a task in an efficient way
D16.*Task Monitoring*	The teacher ought to monitor the activities he is responsible for in a correct and punctual way. This pattern defines the strategies to carry out that task in an efficient way.
D17. *Personal Communication*	The teacher should have a suitable personal and collective communication management strategy as well as one of the

	tools to be used in each case and how to use them. This pattern defines the strategies to carry out that task in an efficient way.
D18. *Mediation*	The teacher ought to be able to mediate both in situations of conflict between pairs and in the relationships with teachers and other profiles involved in training. This pattern defines the strategies to carry out that task in an efficient way.
D19. *Stimulation*	It is considered important that the teacher can be able to maintain a good motivation and work strength among the students, both in a preventive way and taking part in the cases it is necessary. This pattern defines the strategies to carry out that task in an efficient way.
D20. *Êthos*	The teacher is responsible for showing himself with an empathic and caring attitude towards the work and the group of students. This pattern defines the strategies to carry out that task in an efficient way.
D21. *Content Curating*	The content gathering and the ability to manage the generated knowledge in the bosom of a learning community are considered to be essential skills for a teacher. This pattern defines the strategies to carry out that task in an efficient way.
D22. *Feedback*	Every training action should bring about a feedback on the part of the teacher to the activities developed by the students, both personally and collectively. This pattern defines the strategies to carry out that task in an efficient way.
A4. *Settings*	This architectural element defines the intervention standards facing situations where it is necessary to make some adjustments that were unexpected in the learning strategy. The failure of the training initiatives does not happen because of the appearance of problems, but because of the inability to detect and solve them in time.
D23. *Individual Settings*	This pattern defines the set of intervention standards and strategies on the part of teachers and educational support teams to solve the difficulties, which appear on the part of particular students.
D24. *Group Settings*	This pattern defines the set of intervention standards and strategies on the part of teachers and educational support teams to solve the difficulties, which appear in the group of students.
A5. *Evaluation*	This architectural element defines the strategies for the assessment and the quality management of the training initiatives of the institution.
D25. *Learning Performance*	This pattern defines the tools and strategies for the learning performance assessment on the part of the students in the context of the institution and the particular training action.
D26. *Course Performance*	This pattern defines the tools and strategies for the assessment of the course quality, both from the students' point of view and from all the other professional profiles involved.
D27. *Process Reflection*	This pattern defines the decision making process to improve the quality of the whole training process from the strategic plan to the assessment of the evaluation process itself.

Table1. GRIAL's Architectural and Design language pattern elements definition

7. Conclusions

The language of pattern which is presented in this work is the result of more than a decade of research and implementation of the GRIAL methodologies in an *eLearning* model based on the importance of the human factor and on the essential role which falls to the teaching profiles in a training process. Nevertheless, the experience accumulated makes it possible to claim that this model can be applied, with the necessary variations, to institutional and corporative contexts, which have an *eLearning philosophy* different from the one that is beneath this research. It is, therefore, a model which is relatively independent from the methodological and strategic approach which intends to gather the necessary knowledge and experience to start an online training strategy or check the health or the possible malfunctions in processes and virtual training strategies which are already working. The experience of applying this model in different contexts allows claiming that its consistency and durability is, besides, independent from the technological factor, since it is not linked to particular technological solutions, and it does not confess "devoted" to any tendency or particular learning methodology.

The implementation of this model, in the shape of a map of patterns, depends on the institutional decisions, which should belong to each organization in search of its *virtual identity*. The more it differs from the model presented here, the more the suggested solutions for each of these patterns will have to be explained, especially in the most concretion level or *idioms,* whose applications will, logically, be very tied in with the context for which they have been planned. Nevertheless, both architectural and design levels can be perfectly exportable to other contexts, with very few modifications, and they lend an interesting method for the gathering and formalization of experience inside a training institution, processes which the institutions hardly tackle and that suppose an extraordinarily valuable knowledge.

8. Acknowledgements

We would like to thank the Ministry of Science and Innovation of the Spanish Government for funding the project under identification number TIN2010-21695-C02-01, and the Regional Council of Education of Junta de Castilla y León (Spain) through the projects GR47 and MPLE (ref. SA294A12-2).

Also, with the support of the Lifelong Learning Program of the European Union. Project Reference: 519141-LLP-1-2011-1-ES-KA3-KA3MP. This project has been funded with support from the European Commission. This publication only reflects the views of the authors, and the Commission cannot be held responsible for any use that may be made of the information contained therein.

This research work is made within University of Salamanca PhD Programme on Education in the Knowledge Society scope.

Finally, authors would like to thank their partners at GRIAL research group http://grial.usal.es for their contributions and support.

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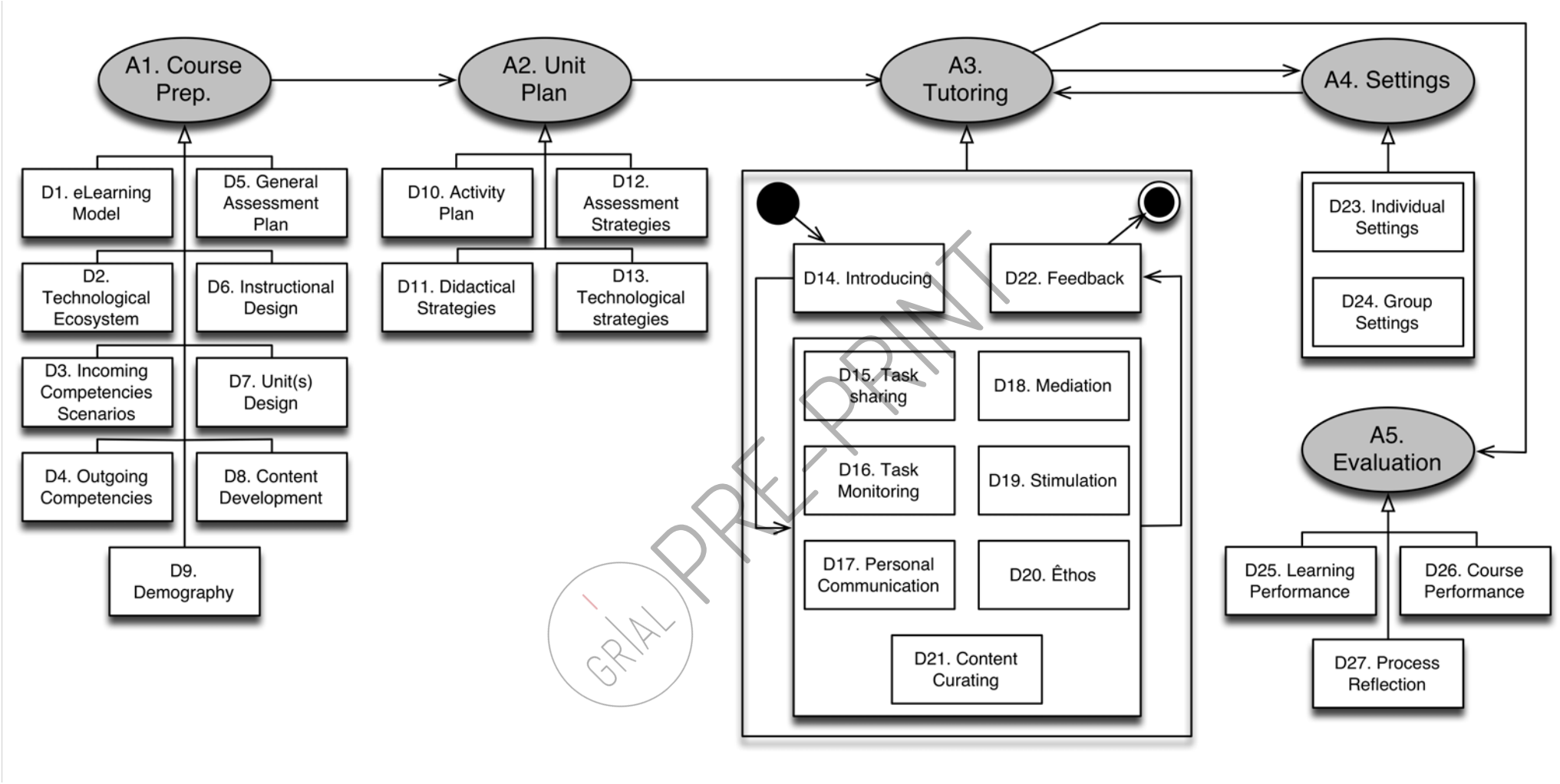

Figure 2. GRIAL's language of pattern for *eLearning* (Architectural and Design elements)

Seoane Pardo, A. M., & García-Peñalvo, F. J. (2014). Pedagogical Patterns and Online Teaching. In F. J. García-Peñalvo & A. M. Seoane Pardo (Eds.), *Online Tutor 2.0: Methodologies and Case Studies for Successful Learning* (pp. 298-316). Hershey, PA: IGI Global.

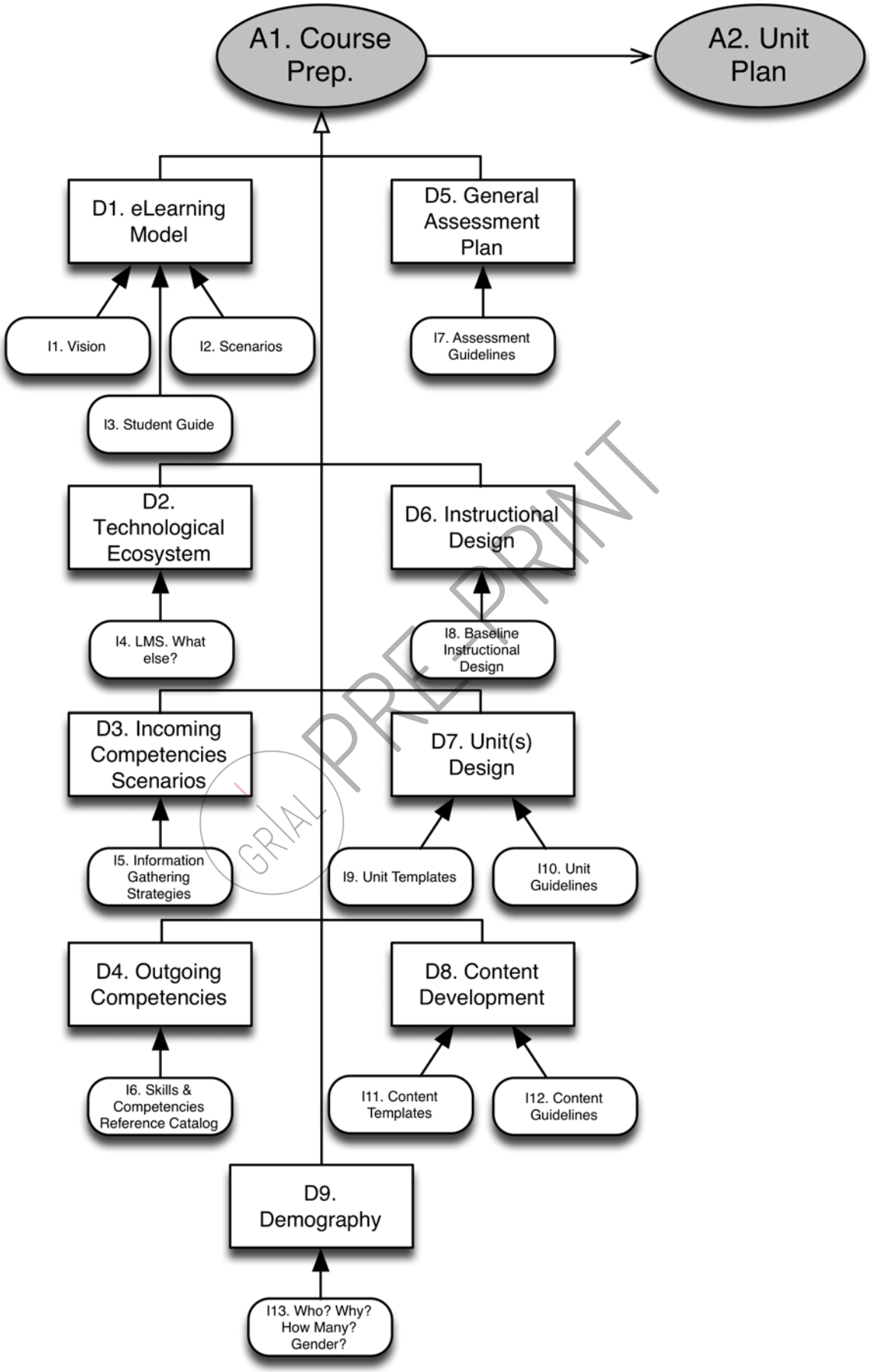

Figure 2. GRIAL's language of pattern for *eLearning* (Strategic plan, full view)

Seoane Pardo, A. M., & García-Peñalvo, F. J. (2014). Pedagogical Patterns and Online Teaching. In F. J. García-Peñalvo & A. M. Seoane Pardo (Eds.), *Online Tutor 2.0: Methodologies and Case Studies for Successful Learning* (pp. 298-316). Hershey, PA: IGI Global.

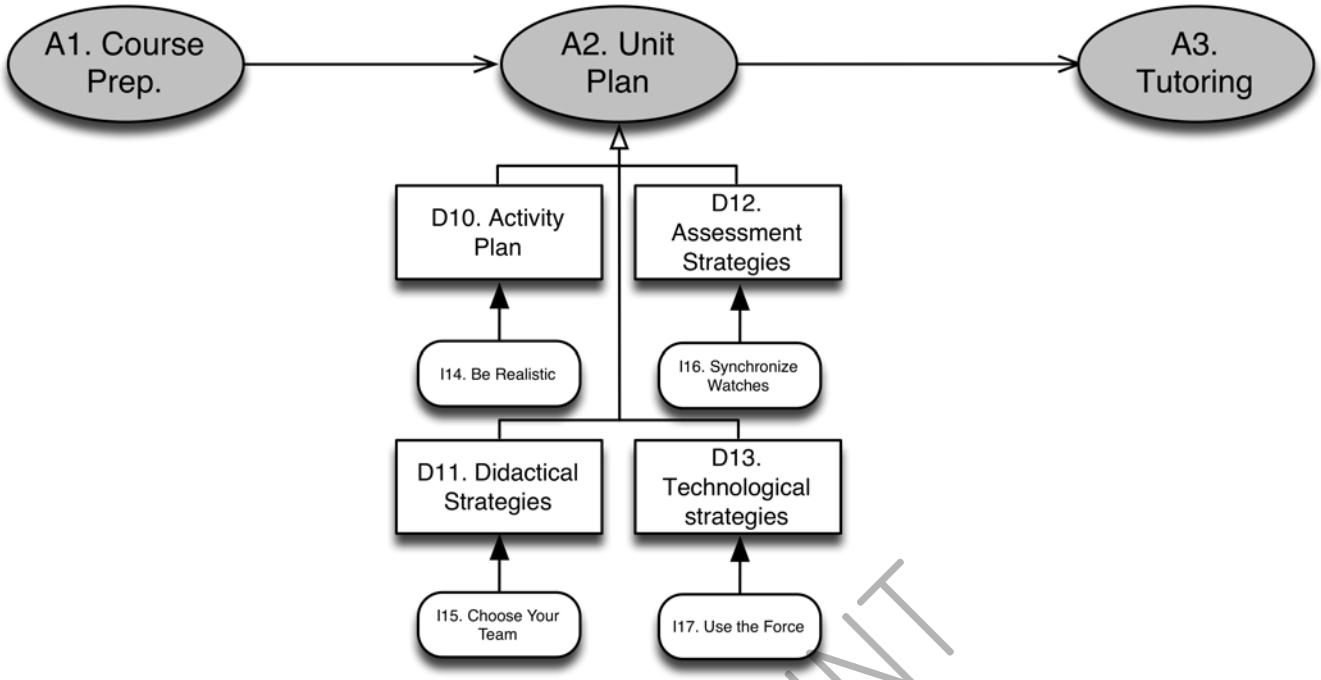

Figure 3. GRIAL's language of pattern for *eLearning* (Instruction planning, full view)

Seoane Pardo, A. M., & García-Peñalvo, F. J. (2014). Pedagogical Patterns and Online Teaching. In F. J. García-Peñalvo & A. M. Seoane Pardo (Eds.), *Online Tutor 2.0: Methodologies and Case Studies for Successful Learning* (pp. 298-316). Hershey, PA: IGI Global.

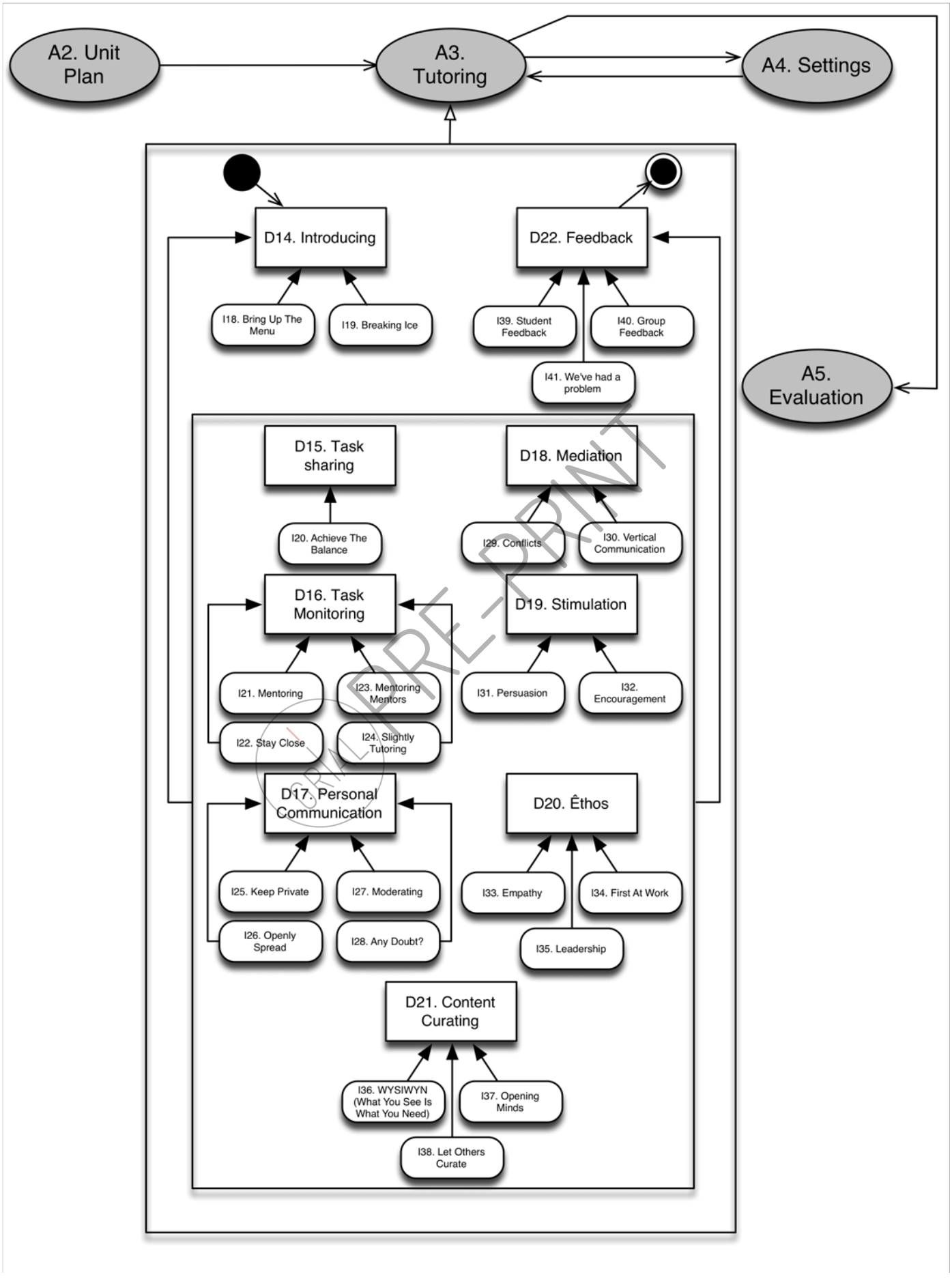

Figure 4. GRIAL's language of pattern for *eLearning* (Teaching action, full view)

Seoane Pardo, A. M., & García-Peñalvo, F. J. (2014). Pedagogical Patterns and Online Teaching. In F. J. García-Peñalvo & A. M. Seoane Pardo (Eds.), *Online Tutor 2.0: Methodologies and Case Studies for Successful Learning* (pp. 298-316). Hershey, PA: IGI Global.

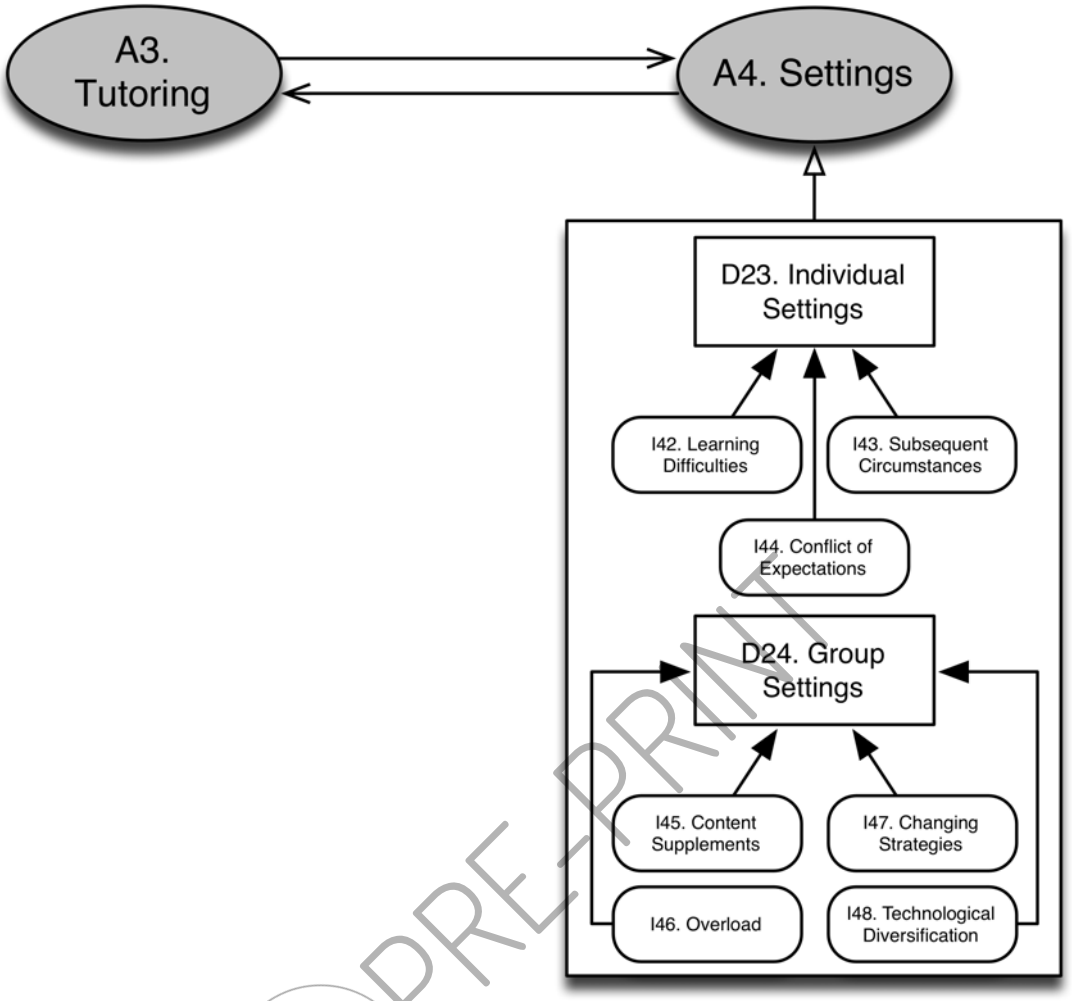

Figure 5. GRIAL's language of pattern for *eLearning* (Settings, full view)

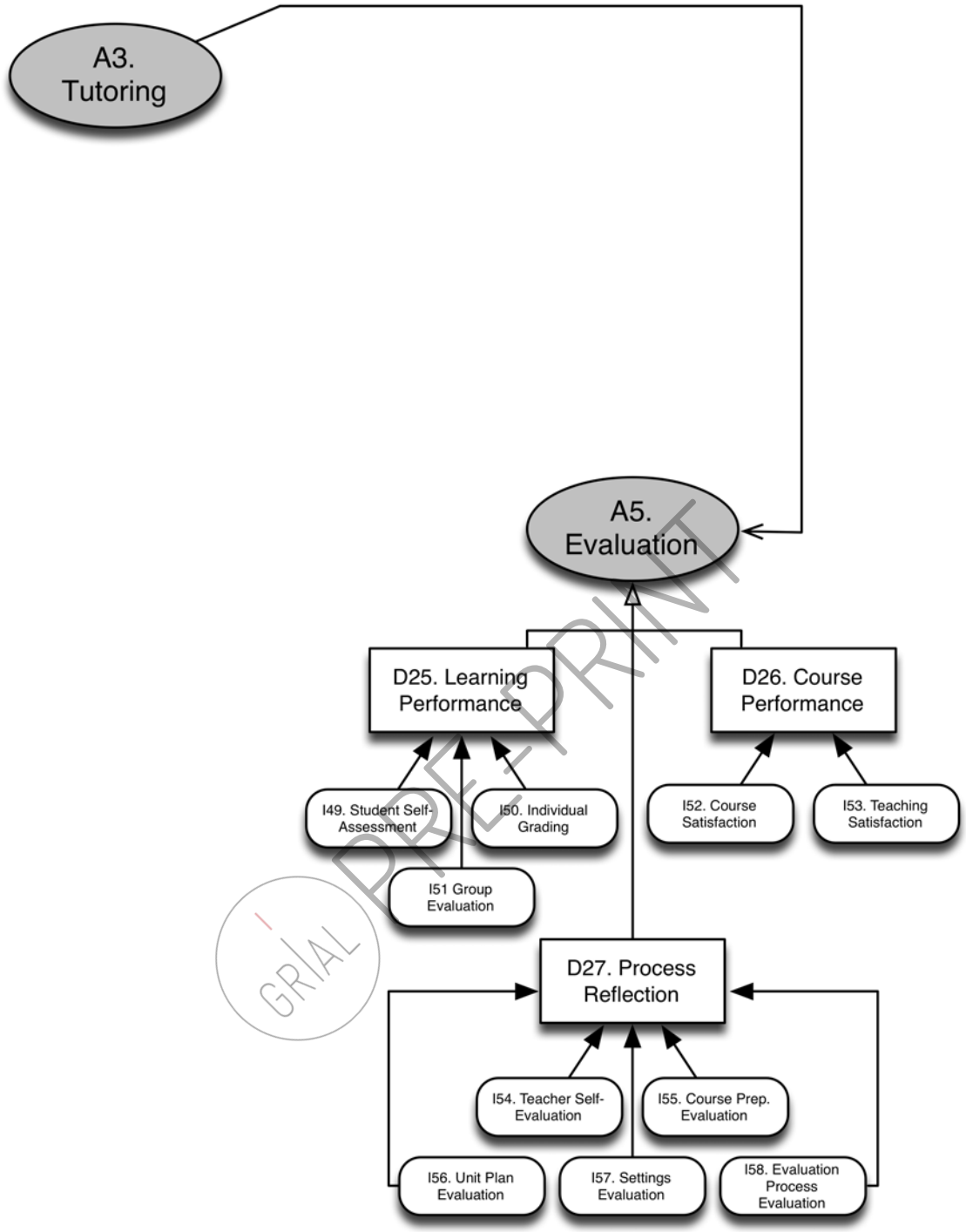

Figure 6. GRIAL's language of pattern for *eLearning* (Assessment, full view)

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