

Review

Pedagogical Patterns for tMOOC as a Social Technology of Relationship

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Abstract: Information communication technologies, as technologies of human relations (ICRT), are linked with pedagogical patterns. Co-design, as a dialogic, participatory, and relational process, leads task based Massive Open Online Course (tMOOC) to justify the use of ICRT for lifelong learning. From sociocultural constructivism principles, patterns offer possibilities for participation by collaborating with professionals (teachers, designers, researchers) and students. On this subject, patterns involve everyone in the learning scenario, transferring best practices in the pattern language. Applying triangulation as a methodology, we are focused on two aims: analyzing the documentation of pedagogical patterns as a technology of relation (O.1), and synthesizing the information according to tMOOC (O.2). Eleven documents are worked on, including scientific articles, research reports, and a conference paper. As a result, patterns are explored and described according to their processes, structures, modalities, methods, and resources. Finally, it is concluded that patterns underline collaborative tasks where the methodology based on design (IBL) is beneficial for the digital competence of educators. However, evaluative research directed to platforms in real contexts is necessary, attending to group management, metrics, and modeling.

Keywords: democratization of culture; digitalization; educational technology; group behavior; life skills

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1. Introduction

The importance of this study consists in its focus on digital teaching competence [1,2], as this becomes a challenge that, under the framework of the European Union [3], stimulates teacher training in skills related to technologies of information and communication [4]. In addition to the fact that young people are attracted to new technologies [5], it also happens that the degree of satisfaction of teachers in their training does not present very high values [6]. Thus, policies should propose solutions [7,8], especially when the perception of MOOCs (massive online open courses) is positive [9].

In this context, the design, production and evaluation of t-MOOC for the acquisition by teachers of Digital Teaching Competences project (DIPROMOOC) originates and, in order to favor initial and permanent education for teachers, directs its work towards tMOOCs in non-university contexts. As Osuna-Acedo et al., indicates, we are in the post-MOOC era, which means that mass courses assume a deep social burden (sMOOC, social massive online open courses), where tMOOCs (or transferMOOCs) are the protagonists [10]. In this sense, participatory research [11], co-design, and co-creation become democratizing socio-educational practices [12–15]. Public participation and its mobilization is a living example of cultural democracy exemplified [16].

The educational visions of MOOCs deserve to be addressed [17] because tMOOCs focus on problem-solving tasks and activities [18,19], enabling the transfer of learning,

transforming pedagogy into action and interaction between professionals, and favoring participation through collaborative pro-community work [10]. In this way, teaching digital competence is stimulated, attending to social responsibility, inclusion, and citizen ethics, in accordance with the most significant competence frameworks [2].

The tMOOCs, with their collaborative transfer approach, are focused on tasks encouraging participation [20], which fits well with the possibilities offered by pedagogical patterns (LD) and learning design platforms (LDS). When the area of relationships with other human and non-human beings are carefully attended to, more possibilities are offered for a policy of rapprochement between differences. Things, and relationships with things, are the subject of social and affective ties [21].

The behavior patterns in MOOCs have been analyzed according to the impact of participation [22], clicks made [23], or permanence in terms of views [24]. However, the learning process within MOOCs is quite a bit more complex. In fact, the study by Del Peral indicates that the tracing and analysis of student profiles, considering their temporal use, does not lead to a higher performance of the MOOC, or to a higher grade [19]. Gamage et al., bring more insights by making use of ethnographic research to understand the behavior patterns that lead students to finish or abandon a course [25]. Being aware of the fusion of research methods, the scope of the DIPROMOOC project affects the design, development, and evaluation of the tMOOC which, in non-university teacher training contexts, acquires special relevance due to the underlying socio-educational involvement. The project paves a path that requires studies in quantity and quality [26].

2. Pedagogical Patterns for tMOOC

The term pedagogical pattern, also known as design pattern [13,15,27,28], comes from the field of architecture [27,29], in particular with the work of Alexander et al. [30]. In the work, "A Pattern Language", they worked with more than two hundred patterns united to configure a city, a building, or a construction. Each initial pattern described solutions to different spaces and encouraged local centers to exchange with nodes of activity. Along the same lines, they proposed distributed spaces, such as clusters, for the promotion of groups of people with face-to-face contact.

In a generic way, taken to the field of education, patterns are understood as simple routines used in learning [31]. It is a matter of habits, or of repeated habits when it comes to learning. The pedagogical pattern is a form of representation that solves a design problem [32].

With a precise structure, the pattern explains enough to offer an action guide, in addition to being flexible when it comes to creatively adapting to other specific needs [33]. A pattern is a guide that solves problems which, having been so often repeated, have generated a response model [27]. Scalability and flexibility are two of its main characteristics. The patterns can be extracted from useful learning objects as a reusable and digital resource. In the same way, learning patterns allow contextualized content from a single model to lead to a different one that is also contextualized.

Gros et al. [13] points out the link with connectivist theories and sociocultural constructivism, and Gonzalez et al. [27] does so with constructivism. In another order, a call to the usual sociocultural approach in the nature of MOOCs is presented in the empirical study dedicated to the level of development of teaching digital competence in [4].

2.1. Patterns as Relationship Technology vs. tMOOC Traits

Some characteristics of the pedagogical patterns, as features of the tMOOC, initially allow the fusion of the double technological-instrumental perspective and permanent training. Taking the 10T's taxonomy from [10], ten pattern qualities related to the characteristics of the tMOOCs are collected (Table 1).

Table 1. Characteristics of the pedagogical pattern vs. features of the tMOOC.

Pattern Characteristics	TMOOC Traits
Contextualization	Transnationalism
Collaboration	Collaborative work
Scalability	Open season
Activity	Transmediality
Introspection from conversation	TRIC (relationship, information, and communication technologies)
Involvement from co-design	Pedagogical transformation
Formative assessment	Authentic tasks
Interactivity from participation	Intercreative talent
Understanding from reflection	Transfer of learning to profession
Flexibility	Tolerance

In this sense, when the pedagogical pattern is contextualized in territorially open spaces (transnationalism), the crossing of cultures is favored. For its part, collaboration provides a meeting point for exchanging knowledge and experiences. In tMOOCs, people teach and learn from each other by becoming active agents [27,34]. In fact, the co-design methodology itself supposes an active involvement, where the people involved are protagonists and agents [8,12], reaching the level of competence explicitly indicated in the most significant frameworks of digital teaching competence [2].

Along the same lines, a pattern is a capsule that, in turn, can be linked to others to adapt to new learning contexts [13,32]. The possibility of the scalability of a pattern does not depend on time intervals, giving space to think about what to do and how to do it without pressure from the system. This open temporality of the tMOOC is indicated in the 10T's taxonomy.

In the same way that the patterns assume activity based on transmedia content and narratives, the tMOOCs notice multiformat and dialogic processes that are characteristic of the patterns evidenced in [14,28]. Transmedia resources reinforce participation, self-sufficiency, and critical capacity.

The pedagogical patterns assume introspection from the conversation, usually when they are co-designed, needing spaces based on dialogue [15,28,29,35]. In the patterns, the participation between professionals (teachers, designers, researchers) and students favors involvement, assuming the importance of coordination between those involved [36]. With co-design, everyone wins in the learning scenario by transferring the practices to the pattern language.

This dialogic process is relational, which, when put into practice, is evidenced in [8] when using technologies focused on relationships, information, and communication (TRIC) in foreign populations. The patterns for family education exemplified in [33] go along this line. The transformation in the behavior of the patterns is reflected as a distinctive feature in the tMOOC since e-participation based on collaboration and joint reflection ensures groups with shared interests [20,37]. There is a new way of building society where the groups involved end up well-rooted and globally connected [10,38].

Furthermore, when attending to the features of the tMOOC, the comprehensive–reflective–flexible line of the patterns impacts the formation of the course, transferring learning to the profession from tolerance [10]. Gros et al., focusing on participatory design, recognizes the process of labor democratization that co-creation entails [12]. Participatory research, due to its narrative, stimulates self-management and the transposition of roles [11], which is not a minor element when it comes to producing pedagogical patterns by an underlying dialogical and interpersonal communication process that favors trust relationships.

2.2. Pedagogical Pattern Systems

A learning design system, or LDS, is a platform that requests content, plans it, and develops it [39]. The more or less formal description of this scenario is also called an educational script, or script and storyboard, or storyboard [8].

A LDS should not be confused with a content authoring tool (CAT) or a learning management system (LMS). However, the concept of LDS is diffuse when noticing associated terms, such as activity management system (LAMS, learning activity management system), environments that support learning designs (LDSE, learning design support environment), instructional management system (IMS), and educational modeling languages (EML), to name just a few. In essence, an LDS addresses learning objectives by responding to who does what, when they do it, with what resources, and what results are obtained [40].

Ultimately, a learning design becomes a pedagogical scenario described more or less formally. This scenario explains an educational process, that is, a complete pedagogical experience that is usual in the pedagogical patterns, as well as its own educational process in the framework of the tMOOCs. Therefore, a learning design can follow an instructional design that is generally associated, but is not always the case. Table 2 shows some learning design systems [13] considering seven criteria, namely, the organism to which the LDS belongs, the place of origin, the type of platform, the pattern system to which it is associated, the most notable action, as well as the pedagogical aids it offers and its uses in learning.

Table 2. Pattern platforms.

Criteria	LdShake	CompendiumLD	Collage	PPC
Organism	Pompeu Fabra University	KMI Open University	University of Valladolid	London Knowledge Lab, Institute of Education
Place	Spain	United Kingdom	Spain	United Kingdom
Type	Social network	Hypermedia	Editor	Modeling
System	LD *	LD *	IMS **	LDSE *** LAMS ****
Action	Activities	Ideas	Patterns	Modeling
Help	Create collaborating	Organize thoughts	Create collaborating	Create collaborating
Applications	PBL Situated learning	Mapping Flexible interfaces	Collaboration Integrate in MOODLE	Repository Models, interprets

Note: * learning design, ** instructional management system, *** learning design support environment, **** learning activity management system.

Continuing with Table 2, two systems whose country of origin is Spain can be seen from the Universities Pompeu Fabra (LdShake system) and Valladolid (Collage system). From the United Kingdom, the CompendiumLD of the Open University and the PPC system of the Institute of Education of the University of London are analyzed. The nature of the four differs since, although LdShake is a type of social network and CompendiumLD

is a hypermedia through cartography, Collage and PPC develop software. On the one hand, Collage is a generic content editor and, on the other hand, PPC specializes in modeling from the interpretation of patterns.

The learning design of LdShake and CompendiumLD, in its technological–instrumental perspective, becomes permanent education in the pedagogical scenario that it supposes. On the other hand, however, Collage and PPC, although they imply permanent education spaces, from their technological–instrumental sense are systems by definition, the first of instructional management and the second of activity management assuming a support role for LD.

The action, help, and use criteria specify each setting in its educational perspective. LdShake works by sharing the design of learning activities, CompendiumLD articulates ideas, Collage collects existing patterns, and PPC models patterns from a dialogic process favoring the community. The grants offered by LdShake, Collage, and PPC have to do with collaborative creation (co-creation in [12]). For its part, the help provided by CompendiumLD serves the organization of ideas. The pedagogical use that CompendiumLD entails stands out because it uses mapping that favors interesting locations and links in the construction of concepts, and does so through a very flexible visual interface. For its part, LdShake works with the problem-based learning method from situated learning, with the sociocultural context gaining outstanding importance as a key factor in the acquisition of competences [34,40,41]. The nature of Collage assumes the collaborative learning design and its scalability, which allows it to be integrated into MOODLE. Finally, the PPC interprets patterns under modeling and abstraction processes, being a repository of pedagogical patterns in itself.

3. Materials and Methods

Under the general objective of inquiring about the difficulties of organizing a training action, the significance that relationship/interaction tools have in non-university contexts and that is linked to patterns is studied. For this, documents on pedagogical patterns are analyzed (Specific Objective 1, O.1) and the information from the use of tMOOC (Specific Objective 2, O.2) is synthesized. For this, a data triangulation methodology is used [42–45], assuming the complexity of the process [46].

This is an exploratory, inductive, and descriptive study framed in the state of the art. Following [47], the collection of information is merged with the analysis at the beginning of the process, obtaining documents como resultado de una (as a result of a) descriptive bibliographic review [48,49], along the lines exposed by [50]. The selection of texts is carried out by interest. Selection by interest is a characteristic of descriptive or narrative literature reviews because it detects research gaps [49]. For [51], the literature review involves information scanning, but also a description of the study topic, an exam, or a discussion of what has been accomplished previously.

3.1. Information Collection Strategies

For triangulation, three strategies are applied, namely, the narrative literature review [48,49] itself, the summaries, and the dissemination.

A narrative literature review comprises three steps: the selective wandering of targeted information from DIPROMOOC and automated notifications from ResearchGate and Academia.edu; the tracking of primary sources and multimedia documents with non-exclusive criteria of the author's scientific maturity (obtained through Google and Dialnet analytics), the currentness of the sources (year of publication), and the popularity of the cited author (verified with Google and Dialnet analytics); the identification of keywords in Spanish and/or English in WoS and Google Search, finally using the pattern words "MOOC", "learning design" – "LD" and "LDS" – and "co-design". The reliability and validity of the sources has been based on the solidity of WoS and Dialnet databases, the prestige of scientific events, and the quality of scientific journals.

For triangulation, the abstracts are collected on grids for their versatility. Matrices facilitate the creation of typologies [48] and give consistency to the data collection and analysis [52]. Matrices, when handling repeated information, provide coherence since when the information is repeated it is because it is linked in some way [48]. Summaries are also used. In both cases, they are deposited within analytical reports. Taken from the progress and results reports, the documents are summarized by “Author/Year. Location”, the “Description” of the analyzed work and the procedure followed, “Modality” (face-to-face, virtual or both), the “Model/Method” used in the design of patterns, and “Resource”, indicating the material produced.

In Tables 3–5, available in the next section, an analysis is carried out considering the location, expanding the summaries on the basis of previous annotations. The new grids deepen the initial descriptions and standardize the descriptive elements, making it easier to obtain results. In addition, the criterion of “Author/Year. Location” is replaced by “Author (Year). Country”. The change is due to the fact that the new readings, together with the past ones, indicate the university institution for which they work, making it more coherent to use the country of said institution. Finally, the word “model” is eliminated from the criterion “Model/Method”, as it is less representative in the selected research.

Table 3. Grid of works on pedagogical patterns in Spain.

Author (Year). Country	Description	Modality	Method	Resource
González (2012). Spain	Pattern language Constructivism University context Co-design	Face-to-face- Virtual	Alexander	Subject pattern
Gros, Escofet, and Marimón- Martí (2016). Spain	Narrative framework Iterative analysis 4-phase pattern University context	Face-to-face- Virtual	IBL * DBR **	Co-design process Pattern structure

Note: * IBL—inquiry-based learning, ** DBR—design-based research.

Table 4. Grid of pedagogical patterns in the United Kingdom.

Author (Year). Country	Description	Modality	Method	Resource
Pachler et al., (2009a, 2009b). UK	Co-design Conversation Follow-up Structure Stories and others Not university Participation Collaboration Complexity	Face-to-face Virtual	ECD *	Patterns Formative electronic assessment
Pachler et al., (2010). UK	Co-design Collab- oration Conversation Follow-up Lots of tools Iterative process Commitment Analysis	Face-to-face Virtual	IBL **	Patterns Formative electronic assessment Audio files Custom software design

	Modeling Practice domain Simple structure Not university			
Mor, Warburton and Winters (2012). UK	Simple structure	Face-to-face Virtual	IBL **	Patterns for workshops
Mor et al., (2014). UK	Co-design	Face-to-face Virtual	IBL **	Narrative Designs Patterns
Warburton and Mor (2015). UK	MOOC development Iterative design Tiered approach 3-step design Not college?	Virtual	SNaP! *** en PPW ****	25 narratives 20 patterns 5 scenarios

Note: * ECD—evidence-focused design; ** IBL—inquiry-based learning; *** SNaP!—scenarios, narratives, and patterns; **** PPW—participatory patterns workshops.

Table 5. Grid of pedagogical patterns in Australia, Japan, and Costa Rica.

Author (Year). Country	Description	Modality	Method	Resource
Goodyear (2004). Australia	Active methods Structure Fluid design Conversation Iterative Process Academic	Virtual	Alexander	Discussion group pattern Pattern language for the task “Debate”
Isaku and Iba (2016). Japan	Pattern language Group work Family education Co-design in stages Participation Collaboration	Face-to-face	Alexander	Patterns for (co-) cooking
Acuña-Sosa and García-González (2019). Costa Rica	Symmetric relationship PEA ** Iterative process Story analysis Recordings Observation High Education	Virtual	IBD *	Co-design analysis

Note: * IBD, design-based research; ** PEA, open teaching practices.

Due to the nature of the DIPROMOOC project, the dissemination of processes and results is used as an information gathering strategy for several reasons. Both the reception of messages related to scientific events and invitations to publish have been sources to present the progress of the study. Coupled with this, new sources of information are known.

3.2. Research Techniques

Expert judgments [2] and information triangulation [53] have been used to offer a reliable and valid research method. For the first, blind pair assessment is used, and for the second, report-based triangulation. For Corujo-Vélez et al., the triangulation of data allows for contrasting and comparing, in this case, three analytical reports [54].

3.3. Research Tools

Eight research tools are applied (Figure 1), and from them we must distinguish five that have been used at all times and another three that have been used at a specific moment. In the first research phase, automatic notifications from ResearchGate and Academia.edu, and the WoS, Google Search, and Dialnet databases, are used. In the second phase, the memorandum is used punctually as a response to the expert evaluation. Reports (3), the digital repository (3), grids, e-mail, and web pages are used throughout the process. The three analytical reports are the progress report, the results report, and the final report. With the grids, typologies are elaborated along the lines of Mor et al. [55]. The e-mail guarantees the entry and exit of current information and the web pages used are of scientific dissemination.

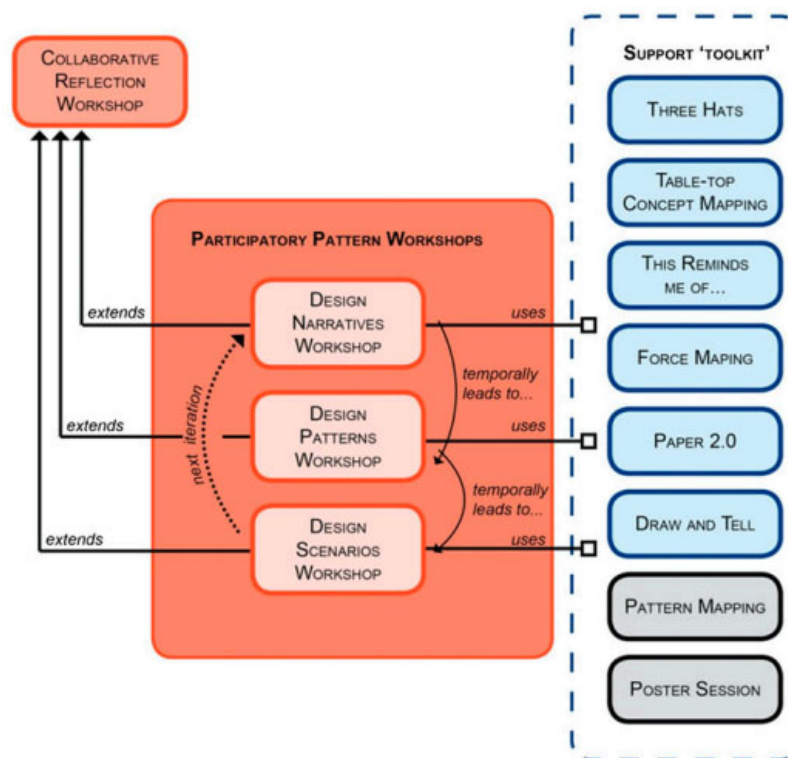


Figure 1. SNaP method! (scenarios, narratives, and patterns) in the format of participatory patterns workshops (PPW).

4. Results

Next, the results of the specific objectives are collected, namely, to analyze documentation on pedagogical patterns (OE1) and to synthesize the information from the use of tMOOC (OE2).

4.1. Document Analysis on Patterns

Eleven documents are worked on, including scientific articles, research reports, and a conference paper. Attending to university entities that form it, there are two works located in Spain (University of Alcalá de Henares, University of Barcelona, University of

Vic-Central University of Catalonia, and Open University of Catalonia), six in the United Kingdom (University of London, The Open University, and University of Surrey), one from Japan (Keio University), one located in Australia (University of Sydney), and another in Costa Rica (UNED Costa Rica). Four works correspond to non-university training contexts, namely, vocational training [14,15] and family education [33]. One of them offers a pattern design applied to MOOCs in particular [28].

Considering the face-to-face or virtual context, the analysis identifies seven works on pedagogical patterns in both modalities, three in a virtual modality only, and one face-to-face. Regarding the method or model used, the design of patterns from those of Alexander, inquiry-based learning (IBL), evidence-centered design (ECD), and the method of scenarios, narratives, and patterns (SNaP!).

In Table 3, the work carried out by González et al., addresses the pattern language in face-to-face–virtual university education, assuming the constructivist paradigm [27]. Alexander's design patterns applied to a subject are used. In Gros et al., a pattern is built in four phases, in a university context and through co-design methodology, under an iterative process assuming a narrative framework [13]. The phases are discussion–abstraction–formalization–validation. The structure of the pattern follows the criteria of context–problem–Solution. A design-based investigation (DBI) is applied, assuming the IBL, obtaining a pattern structure and an X-ray of the co-design process.

The grid in Table 4 delves into the selected UK jobs. Led by Pachler et al. [15], the methodology based on patterns from the evidence-centered design (ECD) addresses the electronic monitoring of learning (formative electronic assessment or e-assessment). The diversity of methods to make the evaluation more dynamic, assuming a conversational framework, is highlighted. The pattern structure follows the series resume–problem–context–solution-related patterns–support–justification (theoretical). It works with stories that will be told to others and includes directed, serial, and open activities, where the use of technology is just one more tool.

As a resource, Pachler et al. [14] offer a list of formative electronic assessment patterns working in non-university (over 16 years) and university contexts.

In Pachler et al. [14], participation and collaboration in groups is emphasized, assuming the iterative process. A context of engagement, analysis, and modeling is favored. In the design of pedagogical patterns, we work with case histories, discussed among peers and collected on the wiki under a template prepared by the team to standardize the speeches and facilitate the analysis. Social, cognitive, and technically complex interactions are linked, generating mastery of the practice. IBL, or inquiry-based learning, applies. The structure of patterns is simplified under the context–problem–solution criterion. It works with teachers (in pairs) and apprentices (individually). Of the five cases analyzed (university undergraduate in case 1 or more than 16 years in case 5), non-university contexts are assumed, obtaining audio files (with the use of Audacity and a digital audio recorder on a Dictaphone) and a custom software design.

Following Table 4, Mor et al. [56] coincides with Pachler et al. [14] by offering a simplified pattern structure from the context–problem–solution criterion. The modality is face-to-face–virtual with the IBL method. As resources, workshop patterns are obtained. In [57], the methodology based on pedagogical patterns is used, in face-to-face–virtual mode and with the IBL method. As resources, they provide narrative designs and pedagogical patterns.

The work of Warburton et al. [28] represents great relevance for several reasons. The first is that they create a MOOC. In addition, simple cycle patterns are integrated (iterative design). They use a tiered approach to develop, refine, and test patterns.

The study attends to the permanent formation reason for why it works in non-university contexts. The fifth reason is that they distinguish, in three steps, the design activity of a pedagogical pattern: 1st, narrative patterns with the criterion situation–task–actions–

result–reflection, using a template; 2nd, pedagogical patterns in themselves, from the discussion and interrogations obtained from the narratives, ending with a mapping of the interactions; 3rd, design scenarios exploring testing the five criteria.

Finally, patterns are obtained for narrative, design, and scenario workshops. They work from an iterative temporal process and a support toolkit linked to concepts, counted reading, mapping, and posters (Figure 1).

With the SNaP! (scenarios, narratives, and patterns) method implemented under participatory pattern workshop formats (PPW), the MOOC evidences the virtual modality. A total of 25 narratives, 20 design patterns, and 5 scenarios are obtained under a workspace supported by LdShake (<http://ldshake.upf.edu/>, accessed on 3 January 2022).

Looking at other countries (Table 5), the research of Goodyear et al. [32] focuses on a teaching methodology in a university context. A pattern structure is offered from the task–organization–resources criterion.

It is a fluid design process based on iterative conversation. It is presented in virtual mode, taking Alexander’s patterns as a method. Finally, a pedagogical pattern focused on the discussion group and a pattern language is offered for the discussion task. Following Table 5, Isaku et al. [33] agrees with Goodyear et al. [32] in the use of the Alexander patterns method, although in face-to-face mode.

They use a pattern language oriented to group work in a non-university context (family education). As a produced resource, it offers patterns for collaborative cooking. In [36], the systematic, iterative, and narrative-based co-design process within the university is addressed. Interdisciplinary teamwork and active, collaborative participation with a symmetrical relationship stand out, giving the students a leading role.

Acuña-Sosa [36] focuses on open practices (PEA) through co-design in five stages, namely, conceptualization–exploration–ideation and operationalization/prototyping–evaluation/reflection. It is a collaborative and participatory work, analyzing five previously scripted stories to standardize the analysis. Post-observation template recordings are used. The symmetrical relationship between those involved (students–teachers–researchers) and their active roles stand out. It is presented in virtual mode with the research method based on design (IBD). As a resource, a co-design analysis is obtained.

4.2. Synthesis Linking the Use of Pedagogical Patterns with tMOOC

To synthesize the information from the use of tMOOC as a relationship technology, the traits of the tMOOCs extracted from Taxonomy 10 T’s and the general characteristics of patterns from [10] are compared with the specific characteristics of the deep descriptions extracted from the studies in Spain [13,27], in the United Kingdom [14,15,28,56,57], and in Australia, Japan, and Costa Rica [32,33,36].

The procedure followed consists of meeting the criteria of “Author (Year). Country” and “Description” for each analyzed work (Tables 3–5). For this, the descriptions are listed in milestones, avoiding repetition. From the sources analyzed, 23 descriptive milestones are obtained for university and/or non-university contexts (Table 6). The milestones are associated with one or more tMOOC traits, and with the general characteristics of pedagogical patterns extracted from Taxonomy 10 T’s, listing each milestone in alphabetical order.

Table 6. Descriptive milestones of pedagogical patterns associated with tMOOC features and the general characteristics of patterns for university and non-university contexts.

Descriptive Milestones of Pedagogical Patterns		
1. Analysis	9. MOOC	17. Observation
2. Co-design	10. Staggered	18. Participation
3. Collaboration	11. Structure	19. Pattern
4. Complexity	12. Recordings	20. Stories and others
5. Commitment	13. Iterative	21. Symmetric relationship

6. Constructivism	14. Active method	22. Follow-up
7. Conversation	15. Modeling	23. Group work
8. Practice domain	16. Tools	

As a result, a profile of tMOOC is obtained as a relationship technology through three steps. Each descriptive landmark is first identified with each tMOOC trait and the characteristic of the pattern that represents that trait. Second, the results are presented by simplifying the process, grouping each series in tables (tMOOC trait–pattern characteristic–descriptive milestones). In the last step, the text is chained, allowing the information to be synthesized.

The synthesis that collects the obtained results indicates that the pedagogical patterns contextualize learning. Hence, transnationalism is a feature of the tMOOC, becoming a technology of relationships (TRIC) when it assumes complexity. There is commitment in the development of the MOOC, and there is an iterative process as well as models, observations, stories, and other activities in a symmetrical relationship between those involved and group work.

The patterns imply collaboration in learning. Collaborative work is a feature of the tMOOC, becoming TRIC when there is co-design, collaboration, commitment, and mastery of practice (open practices or PEA). In the development of the MOOC, active methods, observation, participation, stories and other activities, a symmetrical relationship with those involved, and group work are assumed.

The pedagogical patterns propose a structure based on the scalability of learning. For this reason, open temporality is a feature of the tMOOC, becoming a TRIC when it assumes constructivism. With this, there is mastery of the practice in the development of the MOOC with a stepped approach, a simple structure, and an iterative design, modeling, and a pattern language in four phases or three steps, being, therefore, fluid.

Pedagogical patterns imply activity in learning. This provides transmediality as a feature of the tMOOC, becoming a TRIC when there is commitment. Constructivism and domain of practice (PEA) are assumed in the development of the MOOC. It has structure with recordings, iterative analysis, active methods, modeling, many different tools using observation, participation, stories, and other activities in a symmetrical relationship during follow-ups and group work.

The pedagogical patterns imply introspection from the conversation during learning. Information and communication technology is a feature of the tMOOC, becoming a TRIC when there is collaboration. For this, the complexity, commitment, and conversation in the development of the MOOC with recordings, an iterative design, active methods, observation, stories, and other activities are assumed under a symmetrical relationship when working in a group.

In pedagogical patterns, there is an implication from the co-design of learning. This contributes to the pedagogical transformation that is a feature of the tMOOC, becoming a TRIC when there is co-design, collaboration, commitment, conversation, and mastery of practice (PEA). In the elaboration of the MOOC, an iterative structure with active methods, modeling, and many different tools assuming the observation and creation of the fluid pattern is assumed, that is, with stories and other activities in a symmetrical relationship within group work.

In the pedagogical patterns, there is a formative evaluation of learning or electronic monitoring. This requires authentic tasks that are a feature of the tMOOC, becoming a TRIC when there is analysis. Complexity, commitment to constructivism, conversation, and mastery of open practices are assumed during MOOC development. There is a tiered approach with a simple structure, recordings, an iterative design, active methods, many tools, observation, stories, and other activities, and a symmetrical relationship during follow-ups and group work.

The pedagogical patterns present an interactivity from participation during learning. For this reason, intercreative talent is a feature of the tMOOC, being a TRIC when it assumes co-design, collaboration, complexity, and commitment to conversation in the domain of practice. In the development of the MOOC, there are active methods, a great diversity of tools, observation, participation, stories, and other activities. Group work is carried out under a symmetrical relationship between those involved.

The pedagogical patterns imply the understanding of learning from reflection. For this reason, the transfer of learning to the profession is a feature of the tMOOC, becoming a TRIC when it has a commitment of constructivism. For this, the conversation and mastery of the practice in MOOC development is assumed. There is a structure, recordings, an iterative process, active methods, models and observations of the pattern language through stories, and other activities in a symmetrical relationship, with follow-ups and group work.

Pedagogical patterns imply flexibility of learning. Therefore, tolerance is a trait of the tMOOC, becoming a TRIC when there is co-design and collaboration. Complexity and commitment are assumed, with a constructive approach based on conversation, an iterative design with active methods, lots of tools, and participant observation in the pattern, with stories and other activities, in a symmetrical relationship within group work.

5. Discussion and Conclusions

From the support and evidence of the data, it is concluded that the technologies of relationship are directed towards pedagogical patterns. Co-design, as a dialogical, participatory, and relational process, leads the tMOOCs to justify the use of TRIC in continuing education by merging the pattern language in them, as [12,13] emphasize.

It has been shown that patterns emphasize collaborative tasks and that the design-based methodology (IBL) is beneficial for the formation of digital teaching competence [3–5]. However, evaluative research directed to platforms in real contexts is necessary, attending to group management, metrics, and models in order to demonstrate the relationships for the reasons discussed below.

The main characteristic of pedagogical patterns lies in assuming participation [14,36] as an emblem. Participation is especially necessary today [16,21]. There are methodologies that promote free spaces [12,20], emphasizing social justice [13] on the basis of symmetric relationships [36], conversation [14,15], and collaboration [32,33,36], which requires a narrative/qualitative follow-up that is often not perceived in research.

Warburton et al. [28] warn of the need to refactor the elements of their pattern when there is some overlap. It is recommended to include links in the language of adjacent and complementary patterns. On the positive side, their research has generated a robust metapattern in one of the teams that has developed MOOCs. In addition, the workshop work has assumed a scaffolding that shortens the participatory design mechanisms. Iterative movement is also recommended because it refines the patterns themselves.

The pedagogical patterns in the MOOC use a language based on tasks and collaborative learning activities. Osuna-Acedo et al. [10] shows a higher degree of satisfaction. However, more general structures of good practices in pattern design are needed.

From the point of view of formative evaluation based on patterns (formative e-assessment), the studies show [14] and conclude [15] the extreme complexity of the process. However, they are a very valuable item from a case-focused inductive approach.

The pedagogical patterns are not a panacea, but they result in democratic procedures, constructive criticism, and empowerment, as recognized by Salvat et al. [8], along the lines of Amin et al. [21].

Regarding this research, the analysis of sources, in addition to being subjective, has been limited. In particular, a narrative [49] or descriptive [48] review should be completed with a systematic review. Da costa et al. [58] recognizes the weaknesses of the narrative or traditional review because it does not follow a pattern, it is tendentious, and it abandons the relevant literature. A systematic review broadens the research objectives [59] and

defines the methodology, reducing the probability of bias [60]. All in all, it is a first step to open new spaces by learning about the characteristics of the patterns linked to the use of tMOOCs as relationship technologies. Similarly, another limitation of the study is the lack of comparison with other contexts. In this sense, as a prospective future, it is proposed to carry out the same analysis in other institutions and/or organizations. To do this, the economic expense that it entails must be faced, an issue that this research does not raise but that is necessary [7] in the Spanish context when there is evidence of its viability and practice [28,35,56,57].

The success of the MOOC needs self-motivated students. Here, due to the characteristics of the tMOOCs, the reflective and critical practice of the rest of those involved is added, assuming the code with dialogue and tolerance. Finally, with Pachler et al. [14], it is necessary to guide and advise professionals, and to formalize pattern standards, with the added needs of financing and creating a network of practitioners and developers.

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