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Concept Paper

Model for the Evaluation of Teaching Competences in Teaching–Learning Situations

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Abstract: Social changes have brought educational challenges at all levels of education. One of the most important elements has been adopting the development of competences as a main goal. As regards teacher training, competences have been included in university degrees responding to a traditional concern related to teacher training: the necessary relationship between theory and educational practice. The objective of this work, in the Spanish context, is to define a model for the evaluation of didactic-disciplinary competences (frequently taught in university classrooms, in a theoretical way) within the framework of the school practicums of the degree in early childhood education (the unique practical context where a real application of competences may be assessed before professional performance). For this purpose, we analyzed the legislation (the specific didactic-disciplinary competences of the ECI/3854/2007 Order) and the school practicum plans of Spanish universities, in order to provide a useful tool to know how students apply theoretical learning in their classroom practices. The resulting model, focused on the learning of natural sciences, social sciences and mathematics, enables understanding the level of development of the didactic-disciplinary competences and can be considered as a conceptual framework to design instruments for different contexts.

Keywords: higher education; competences; model; evaluation

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1. Introduction

The social changes that have been taking place at an unprecedented speed since the end of the last century have had remarkable effects in the educational field at all levels. One of the common commitments to the different educational stages has been competency-based training, focused on the development of abilities and skills associated with the processes that we usually carry out in the multiple aspects of our lives (social, cognitive, work-related, etc.) [1]. Beyond how confusing the term competence [2] may still be today, it is a useful instrument to respond to social realities, making it possible to train citizens for a diverse society, to meet the requirements of the productive process and, as we said, to develop the knowledge, skills and attitudes that enable us to act successfully in different areas of social life [1].

At the core of the competence approach is, then, the connection with the environment—which should serve as a reference for training—as well as the necessary relationship between theory and educational practice. In the Spanish context, from Organic Law 2/2006, of 3 May, of Education (LOE) [3], competences (basic, in the case of LOE, and, later, key competences) are incorporated into primary and secondary education classrooms in Spain. In the same vein, the European Higher Education Area assumes the competence approach, transforming the syllabi and changing the methodologies developed [4].

In the training of future teachers, the two aforementioned realities converge: Teachers are trained in competences, and, in turn, they train students in competences in schools. Their own training by competences must involve the development of a professional profile

that also allows them to develop skills in their students [5]. Thus, the delimitation of the so-called teaching competences is a determining factor. Teaching skills has been the subject of numerous studies focused on their conceptualization and delimitation [2,6–8], on the perceptions of teachers at different educational levels [9–12] or on the configuration of models. Among the configuration of models, more in relation to the work we are dealing with, the models developed around the technological and the virtual stand out, such as the well-known Technological Pedagogical Content Knowledge (TPACK) model [13], which establishes three types of knowledge that university teaching staff must possess in order to be able to operate in technological environments (technological, pedagogical and content knowledge); the model of Cabero, Llorente and Morales [14], which also allows the evaluation of teaching performance virtually in four dimensions (disciplinary knowledge of the content, pedagogical, technological and compliance with regulations/standards), which are specified in sub-dimensions; or the Model of Teaching Competences for Online Teaching (MECDL) [15], articulated in three dimensions (anticipation, conduction and assessment of the teaching–learning process). Of a more general nature, and focused on higher education, are Zabalza's model [16], which proposes ten competences for university staff teachers (planning the teaching–learning process; selecting and preparing disciplinary content; providing comprehensible and well-organized information and explanations; handling new technologies; designing a methodology and organizing activities; communicating and interacting with students; tutoring; evaluating; reflecting and researching on teaching; and identifying with the institution and working as part of a team); and that of Torra et al. [17], which identifies seven competences specific to the teaching function in the European Higher Education Area (interpersonal, methodological, communication, planning, teaching management, group work and innovation).

Certainly, the approach by competences, that authors often like [18] to equate to the traditional paradigms of the profession (positivist, practical, socio-critical), becomes important in professional activity and teacher training. Related to the last one, from a training point of view, we assume that graduates of teaching degrees have the academic and professional competences that will enable them to develop their work as teachers in the most satisfactory way [19].

However, from a researcher's point of view, whereas research focusing on the development of competences of in-service teachers or on perceptions about competence models is numerous, that focusing its attention on how these competences included in the degrees are put into practice is not [1]. Research along these lines, which is scarce in quantity, is necessary for a variety of reasons of a different nature. First, teacher training must be practice-focused since this is understood as a key to professionalization [2]. While the profile of graduates in other degrees is more diverse, in the case of teacher training students, their work performance goes hand in hand with teaching practice, whether in formal or non-formal contexts. Second, the competences themselves are only defined by action and can only be understood from the particular context where they are put into practice [20,21]. Their development and assessment cannot be separated from the application; in fact, for teachers' competences to produce real effects in improving teaching, it is necessary to articulate them on teaching tasks in which their practical dimension stands out [22]. Third, and as a determining reason, there are numerous studies [23–26] that highlight a deficient relationship between theory and practice, some of which have a direct impact on the fact that it cannot be assumed that students will effectively apply some theoretical knowledge in the practical reality of classrooms [27].

Considering all the above, it is necessary to propose research that evaluates competences in the specific contexts of teaching practice, especially that focusing on the practical application of knowledge that may be considered more theoretical. Additionally, this evaluation should be carried out within the framework of initial training, since the aim is not to assess the development of the competences of in-service teachers, but rather the application of the competences of the degree in the reality of the classroom, without being influenced by the experience or the school culture of the schools.

With this aim in mind, and limiting our field of study to the training of early childhood education teachers, we ask ourselves the following: is it possible to configure a model that makes it possible to evaluate the application in teaching–learning situations of the more theoretical competence dealt with as part of the syllabus?

With this as a basis, and with the aim of limiting the research, what we set out to do in this work is to define a model for the evaluation of didactic-disciplinary competences for the learning of natural sciences, social sciences and mathematics, within the framework of the school practices of the bachelor's degree in early childhood education.

2. Method: Process and Sources for Model Configuration

Within the framework of an interpretative paradigm and qualitative methodology [28], the configuration of the proposed model was carried out using content analysis as a method [29]. We define the resulting model as inductive–deductive, involving in its configuration both the empiricist-inductive epistemological approach and, above all, the rationalist-deductive approach [30].

In Figure 1, we outline the steps to configure the model, which we will describe in the following.

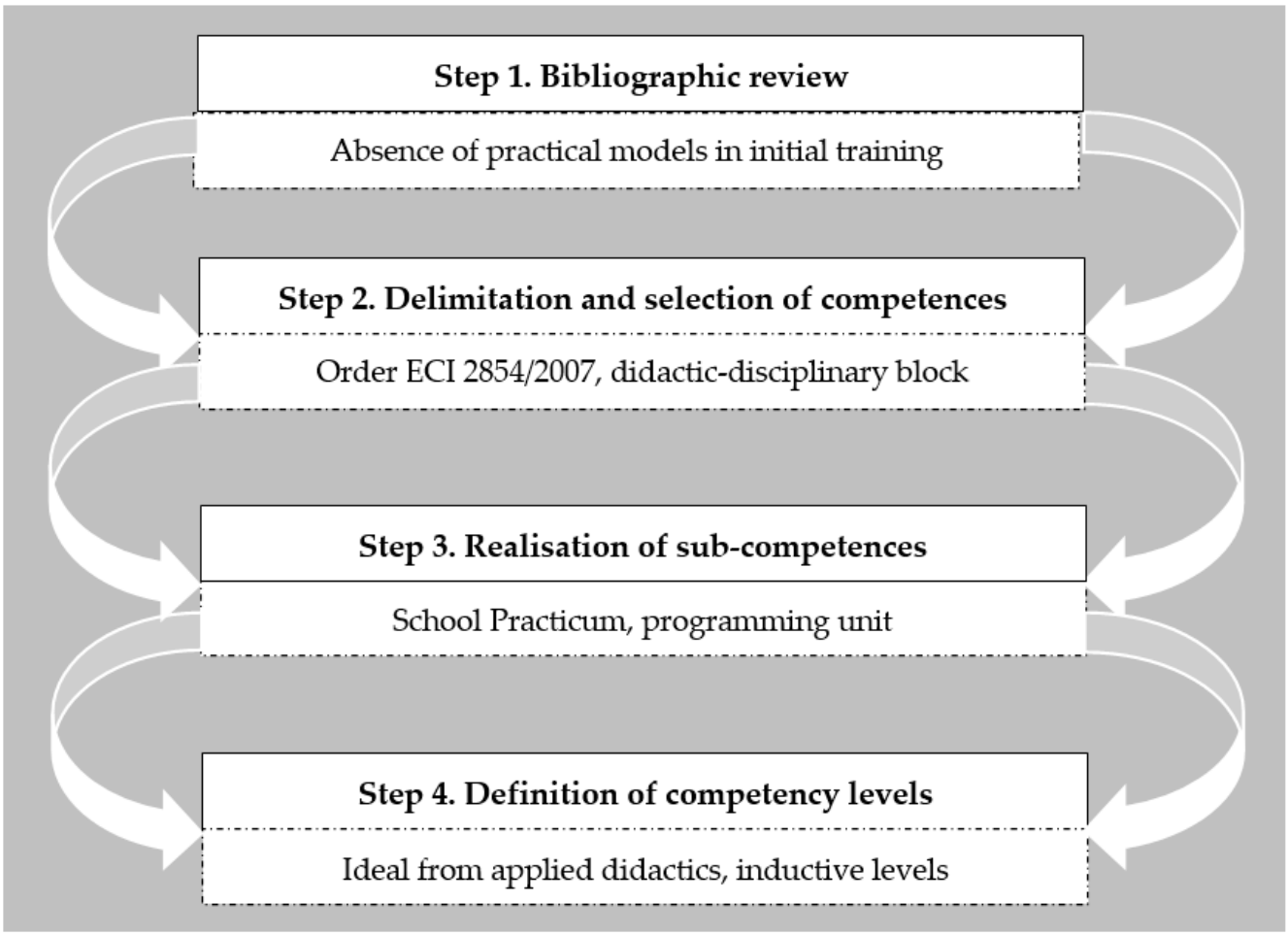

Figure 1. Method for the configuration of the model.

Step 1. Bibliographic review

The first step for the configuration of the model was the identification of the need for its design, which originates this study and the research problem. In addition, this first bibliographical review allows an initial delimitation of the resources or sources for the configuration of the model. Of particular value is the review of Spanish models and

legislation by Zhang [31] and the procedures used for the systematization of the model; in this regard, the proposal by García-Cabrero et al. [15] with their definition of competences, descriptors and indicators is of interest.

Step 2. Delimitation and selection of competences

Given the lack of a model for assessing the teaching competences of trainee teachers—more specifically, for future early childhood education teachers—and the existing diversity in the teaching models proposed for active teachers, the first premise was to delimit the teaching competences that would make up our model.

The official university education system in Spain, which is in line with the European Higher Education Area, establishes that official undergraduate curricula must have 240 European ECTS credits (referring to the volume of work conducted by students), which shall contain all the theoretical and practical information that students should acquire in their university studies [32]. This legislative document, in Section 3.2 of Annex I, establishes the basic competences for all undergraduate students, a series of very general requirements established for all students in terms of skills and knowledge specific to their university studies that will enable them to prepare for future professional activities. However, for the degree that concerns us here, that of early childhood education teacher, it is in Order ECI 3854/2007 [33] where the requirements for the verification of the official degree are established, where twelve general competences are specified—in Section 3—in terms of objectives to be achieved by all students on completing the degree and where the specific competences of all the subjects in the syllabus are specified—in Section 5—divided into three blocks: "basic training", "didactic-disciplinary" and "practicum" (Figure 2).

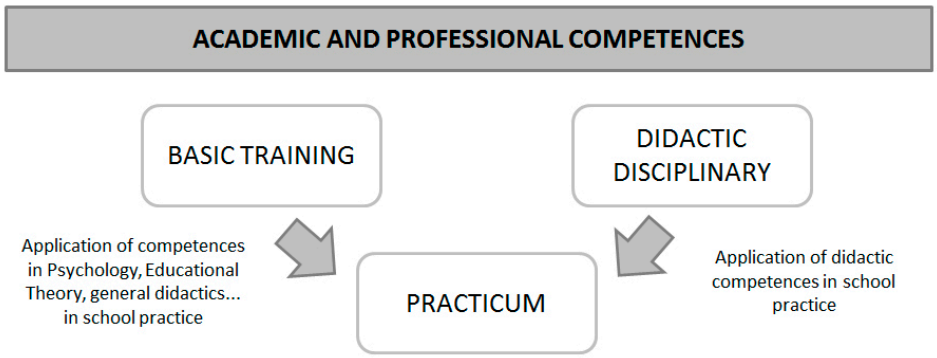

Figure 2. Relations between competences of the ECI/3854/2007 Order.

Since Order ECI 3854/2007 is the only document that defines the competences to be developed by trainee early childhood education teachers, we took the competences included in this document as the basis for the model. Among them, in order to create a model that would allow us to assess the application of the knowledge acquired theoretically in practice, we articulated the proposal around the "didactic-disciplinary" module, which includes the contents related to applied didactics, collected in the different models analyzed under different names, and worked on in the different subjects of the degree, mostly in a theoretical way, and in any case, without application to the reality of the early childhood classrooms.

Table 1 lists the nine competences of the didactic and disciplinary module "Learning Natural Sciences, Social Sciences and Mathematics", which we selected to initiate our model, as well as their relationship with the three areas of knowledge involved (NS: natural sciences; SS: social sciences; M: mathematics). The link to the areas of knowledge was based on the curricula of the Spanish universities approved by the National Quality Assessment and Accreditation Agency of Spain (ANECA).

Table 1. Competences of the didactic and disciplinary module "Learning Natural Sciences, Social Sciences and Mathematics".

Competences	Areas of knowledge
C1. To know the scientific, mathematical and technological foundations of the curriculum of this stage as well as the theories about the acquisition and development of the corresponding learning.	NS, SS, M
C2. To know didactic strategies to develop numerical representations and spatial, geometric and logical development notions.	M
C3. To understand mathematics as sociocultural knowledge.	M
C4. To know the scientific methodology and promote scientific thinking and experimentation.	NS
C5. To acquire knowledge about the evolution of thought, customs, beliefs and social and political movements throughout history.	SS
C6. To know the most outstanding moments in the history of science and technology and their significance.	NS, SS
C7. To elaborate didactic proposals in relation to the interaction between science, technology, society and sustainable development.	NS, SS
C8. To promote interest and respect for the natural, social and cultural environment through appropriate educational projects.	NS, SS
C9. To promote initiation experiences to information and communication technologies.	NS, SS, M

Step 3. Realization of sub-competences

Once the competences that act as the basis of the model were defined, the next step in its configuration was to translate these competences into the teaching practice, taking into account the circumstances in which assessment is to take place.

In this sense, two decisions were made: the consideration of the school practicum as the closest reality, within the framework of the initial training process, to professional teaching performance, and, therefore, its selection as the area around which to articulate and apply the model; and the specification of competences in what we call "sub-competences", based on the analysis of the design and implementation of a programming unit as a fundamental element of teaching. In relation to the first decision, school practicums of the degree in early childhood education constitute an integrated set of teaching initiation practices in the classroom and are intended to help students acquire both the transversal competences of the university and those specific to the subject, together with the learning outcomes associated with them. In this sense, there are several competences that students put into practice in their periods of school practicums. However, perhaps, the one that is most clearly related to verify how the didactic-disciplinary competences are applied in them is that of "participating in the teaching activity and learning to know how to do, acting and reflecting from practice".

Considering the practicum program for the configuration of the model means a commitment to a common implementation of all teacher training plans, regardless of the Spanish university where the degree is being studied. Having analyzed the curricula of Spanish universities and the specific requirements of the subjects related to school practices, we can affirm that, despite institutional guidelines, there is no homogeneity in the distribution of subjects in the different national curricula of the degree in early childhood education, neither in terms of credits assigned to departments, number of subjects (compulsory and optional), placement in a certain course or semester, timing with respect to school practicums nor in what is explicitly requested from students. This is the reason behind the second decision, as it is essential to look for common aspects—in terms of tasks to be performed—within the different plans of existing practicums in Spanish

universities, with the purpose of articulating a model that is useful for all of them or, at least, easily adaptable.

In this vein, the design and the development of a programming unit is a common element of the practicum program of Spanish universities. This usually carries with it among its learning outcomes knowing "to design a programming unit on the contents of Early Childhood Education foreseen in the classroom programming for the period of practices; put it into practice and evaluate it" [33].

Therefore, we took as a base document Order ECI 3854/2007 and the competences selected and included in Table 1, analyzing, in order to specify them in sub-competences, the practicum plans of Spanish universities and how the competences of the Order are translated into the requirements of the practicums.

Specifically, we selected the practicum plan of the University of Murcia for the delimitation of the sub-competences: concretely, the documents associated with the subject of school practicums in the last year of the degree (school practicum IV) [34]. The reason for the selection is given, mainly, by the concreteness and specificity of this university's internship plan, which facilitates the delimitation of categories and their subsequent application to other more general plans; in other words, it allows us to create a model, not specific to the context of the University of Murcia, but sufficiently systematized for evaluation in any of the contexts.

We considered two aspects for the delimitation of the sub-competences. On the one hand, a review of the specific requirements for the development of the program unit in the practicum plan. This question entails the direct specification of some of the sub-competences (C1.1, C1.2, C7.2, C7.3, etc.), which are derived from the list of aspects to be included in the program unit and which, in any case, are prescriptive elements of this unit. On the other hand, the contributions made at the disciplinary and didactic levels of the compulsory subjects corresponding to the didactic-disciplinary module "Learning Natural Sciences, Social Sciences and Mathematics". Specifically, we considered the theoretical contributions included in the teaching guides of the six subjects, two from each of the areas of the syllabus we considered for the configuration of the model (Figure 3).

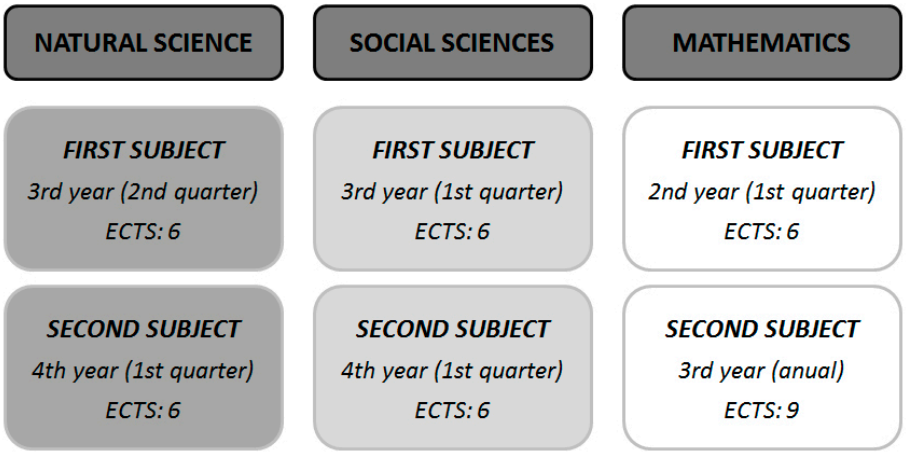

Figure 3. Compulsory subject related to the module "Learning Natural Science, Social Sciences and Mathematics" (University of Murcia).

Step 4. Definition of competency levels

The last step in the configuration of the model was the definition of competence levels. It is in this phase that the inductive approach of the model is most important. In this sense, in order to establish the levels, two steps were followed: firstly, the description of the ideal for each sub-competence in accordance with the contributions made from applied didactics (L3 = high level); and secondly, the definition of levels 2 (L2 = medium level) and 1 (L1 = low level). For this final process, fifteen student internship reports from the

2019/2020 academic year were analyzed, with different levels of elaboration. The analysis of the students' contributions to each sub-competence made it possible to establish levels for each of them, based on a scale of a high, medium or low level of development. As the levels of the competences were inductively established, it is not possible to explain all of them individually due to the limitations of the length of the text. Nevertheless, the concretization of the levels for the sub-competence C1.2. can be taken as an example of the process. First of all, we find didactic objectives that are formulated concretely and without errors ("To hypothesize about the observed phenomenon"). These answers correspond to the theoretical ideal for the sub-competence. Therefore, they allow establishing a high level ("L3. Has no mistakes in the formulation of specific elements"). Secondly, we find examples which, while not entirely incorrect, lack concreteness or representativeness in their formulation ("to strengthen the colors of the venous frogs"). On the one hand, the verb which is used by the student is not the most adequate for a didactic objective. On the other hand, the formulation of the objective does not make it clear exactly what the purpose of the proposal is. These answers force the formulation of an intermediate level ("L2. Has some specific mistakes in the formulation of the specific elements"). Finally, we find wrong formulations, for instance, the delimitation of objectives from the perspective of the teacher and not from the perspective of the learner ("To provide artistic knowledge"). This type of answer belongs to the low level ("L1. Has too many mistakes in the formulation of the specific elements").

3. Model for Evaluation of the Teaching Competences

The full model, the main proposal of our work, can be found in Table 2.

Table 2. Model for evaluation of teaching competences.

Competences	Realization of the Competence in the Teaching Practice	Levels of Development
C1. To know the scientific, mathematical and technological foundations of the curriculum of this stage as well as the theories about the acquisition and development of the corresponding learning.	In relation to the curricular foundations	
	C1.1. To select specific elements (objectives, content and evaluation criteria).	L1. Does not choose a suitable set of specific elements (type, quantity, etc.).
		L2. Chooses a suitable set of specific elements but with little relevance and variation.
		L3. Chooses a suitable, varied and relevant set of specific elements.
	C1.2. To formulate specific elements (objectives, contents and evaluation criteria).	L1. Has too many mistakes in the formulation of the specific elements.
		L2. Has some specific mistakes in the formulation of the specific elements.
		L2. Has no mistakes in the formulation of specific elements.
C1. To know the scientific, mathematical and technological foundations of the curriculum of this stage as well as the theories about the acquisition and development of the corresponding learning.	In relation to the curricular foundations	
	C1.3. To justify the specific elements (objectives, contents and evaluation criteria) in a coherent way.	L1. Does not justify adequately or coherently with the curriculum.
		L2. Uses the curriculum appropriately to justify all the specific elements although there is no coherence between all of them.
		L3. Uses the curriculum appropriately to justify all the specific elements although there is no coherence between all of them.

Table 2. *Cont.*

Competences	Realization of the Competence in the Teaching Practice	Levels of Development
	In relation to learning theories	
	C1.4. To delimit the necessary prior knowledge of child students.	L1. Does not state questions for the detection of prior knowledge.
		L2. States questions for the detection of previous knowledge, which are of a general nature or with little repercussion for the subsequent didactic design.
		L3. States questions for the detection of previous knowledge, whose results are relevant for the subsequent didactic design.
C1. To know the scientific, mathematical and technological foundations of the curriculum of this stage as well as the theories about the acquisition and development of the corresponding learning.	In relation to learning theories	
	C1.5. To consider different levels of depth in the proposal.	L1. Does not consider different levels of depth in the proposal.
		L2. Raises variations in the proposal, linked to specific students or ideas directed to the group/class that are not accompanied by planning.
		L3. Raises different levels of deepening in the proposal, dealing with the group and individual characteristics of the students and designing responses to hypothetical situations in the implementation.
	C1.6. To determine the difficulties associated with the understanding of knowledge.	L1. Does not indicate the difficulties associated with the understanding of knowledge or, if it does, they lack solidity.
		L2. Indicates difficulties associated with the understanding of knowledge, easily applicable to any other content.
		L3. Delimits specific difficulties of the knowledge being dealt with and of the proposed activities.
C1. To know the scientific, mathematical and technological foundations of the curriculum of this stage as well as the theories about the acquisition and development of the corresponding learning.	In relation to learning theories	
	C1.7. To act appropriately in the face of difficulties.	L1. Does not indicate any type of response to the difficulties raised, or does not recognize such difficulties in advance.
		L2. Indicates a change in the teaching practice, this being a specific action not associated with the specific content or a response that does not require deep reflection.
		L3. Indicates responses to difficulties, the result of deep teaching reflection and contextualized in the teaching–learning situation.

Table 2. *Cont.*

Competences	Realization of the Competence in the Teaching Practice	Levels of Development
	C1.8. To justify with bibliographic sources the difficulties encountered.	L1. Does not use bibliographic references about the difficulties.
		L2. Uses a bibliographic reference that does not add substantial value to the understanding of the difficulty.
		L3. Uses one or more bibliographic references that contribute to the understanding of the difficulties and possible answers to them.
C2. To know didactic strategies to develop numerical representations and spatial, geometric and logical development notions.	C2.1. To apply logical-mathematical strategies (problem solving, reasoning and proof, communication, connections and/or representation) in the didactic proposal.	L1. Does not apply logical-mathematical strategies to the proposal.
		L2. Applies overly directed logical-mathematical strategies in the proposal.
		L3. Applies logical-mathematical strategies in the constructivist proposal.
	C2.2. To develop mathematical content (logic, numbers and operations, geometry, measurement and/or statistics-probability) to identify, define or recognize.	L1. Does not develop mathematical content in which students must identify, define or recognize.
		L2. Develops some mathematical content through simple identifications, definitions or recognitions.
		L3. Develops some mathematical contents through simple identifications, definitions or recognitions.
	C2.3. To develop mathematical content (logic, numbers and operations, geometry, measurement and/or statistics-probability) to relate or compare.	L1. Does not develop mathematical content in which students must relate or compare.
		L2. Develops some mathematical content through simple relations.
		L3. Develops some mathematical contents through simple identifications, definitions or recognitions.
C2. To know didactic strategies to develop numerical representations and spatial, geometric and logical development notions.	C2.4. To develop mathematical content (logic, numbers and operations, geometry, measurement and/or statistics-probability) to operate, change or transform.	L1. Does not develop mathematical content in which students must operate, change or transform.
		L2. Develops some mathematical content through simple operations, changes or transformations.
		L3. They develop several different mathematical contents through operation, change or transformation.

Table 2. *Cont.*

Competences	Realization of the Competence in the Teaching Practice	Levels of Development
C3. To understand mathematics as sociocultural knowledge.	C3.1. To associate mathematical knowledge in activities of daily living.	L1. Does not raise activities connecting mathematical knowledge with situations of daily living.
		L2. Proposes some activity that connects mathematical knowledge with examples of everyday situations in a representative way.
		L3. Proposes real or simulated daily activities to work on mathematical knowledge in a comprehensive way.
	C3.2. To consider the phases (mathematization of the context, previous work in the classroom, work in context and later work in the classroom) to teach mathematics from real contexts of everyday life.	L1. Does not contemplate in any activity the phases to teach mathematics from real contexts.
		L2. Contemplates in some activity almost all the phases to teach mathematics from real contexts.
C3. To understand mathematics as sociocultural knowledge.	C3.2. To consider the phases (mathematization of the context, previous work in the classroom, work in context and later work in the classroom) to teach mathematics from real contexts of everyday life.	L3. Contemplates and clearly describes in an activity all the phases to teach mathematics from real contexts.
C4. To know the scientific methodology and promote scientific thinking and experimentation.	C4.1. To include in the proposal any activity that requires observation, manipulation, experimentation, reflection and/or mental effort.	L1. Does not raise any activities promoting scientific thinking and experimentation.
		L2. Raises some activity with a certain manipulative and/or experimental basis, although this is excessively directed and with little depth.
		L3. Raises complete experimental activities for child students that require observation, manipulation, experimentation, reflection and mental effort.
	C4.2. To promote scientific attitudes of a general nature (curiosity, creativity, autonomy, patience, self-confidence and/or cooperative spirit).	L1. Does not promote scientific attitudes of a general nature in any case.
		L2. Occasionally promotes some kind of general scientific attitude in some experimental activity.
		L3. Clearly promotes various scientific attitudes in experimental activities.
C4. To know the scientific methodology and promote scientific thinking and experimentation.	C4.3. To facilitate the creation of mental representations (concepts) and language development.	L1. Facilitates the creation of mental representations (concepts) and language development.
		L2. Facilitates, through experimental activities, the creation of simple mental representations, although it does not help the development of language.
		L3. Facilitates, through experimental activities, both the creation of mental representations and the development of language.

Table 2. *Cont.*

Competences	Realization of the Competence in the Teaching Practice	Levels of Development
C5. To acquire knowledge about the evolution of thought, customs, beliefs and social and political movements throughout history.	C5.1. To include in the proposal some activity around change and continuity.	L1. Does not raise activities considering change and continuity as two compatible elements of the passage of time.
		L2. Raises some activity in which change and continuity are considered, although in a superficial or tangential way.
		L3. Proposes activities that consider change and continuity as compatible elements at the political, social and cultural levels.
	C5.2. To show knowledge of the first-order content (thought, customs, beliefs, social movements and/or political movements).	L1. Does not include content related to the social sciences or shows scarcity in their knowledge.
		L2. Shows a general knowledge of the social science content included in the proposal.
C5. To acquire knowledge about the evolution of thought, customs, beliefs and social and political movements throughout history.	C5.2. To show knowledge of the first-order content (thought, customs, beliefs, social movements and/or political movements).	L3. Shows a deep knowledge of the social science content included in the proposal.
C6. To know the most outstanding moments in the history of science and technology and their significance.	C6.1. To incorporate events or figures relevant to social progress (historical relevance).	L1. Does not incorporate events or figures relevant to social progress in their proposal.
		L2. Incorporates events or figures relevant to social progress, tending towards topics or without reflection on their repercussions in its proposal.
		L3. Incorporates relevant events or figures into its proposal, deepening its contribution to social advancement.
	C6.2. To establish transcendent relationships between the elements that characterize social phenomena and human activities in the natural environment.	L1. Does not establish any relation between social phenomena and human activities in the natural environment.
		L2. Establishes some superficial relation between social phenomena and human activities in the natural environment but without any kind of justification.
		L3. Establishes coherent and justified relations between social phenomena and human activities in the natural environment.
C7. To elaborate didactic proposals in relation to the interaction between science, technology, society and sustainable development.	C7.1. To design a globalized proposal.	L1. Does not design a proposal based on the globalization of contents.
		L2. Designs a globalized proposal but integrating only content from the different areas.

Table 2. *Cont.*

Competences	Realization of the Competence in the Teaching Practice	Levels of Development
		L3. Designs a globalized proposal integrating and contextualizing content from different areas, also taking into account the interests and needs of child students.
	C7.2. To sequence the didactic proposal (initiation, development, application and reflection).	L1. There is no adequate sequential order nor does it contemplate the suggested phases for the proposal.
		L2. There is an adequate sequential order but it does not contemplate activities of all the phases suggested for the proposal.
		L3. There is an adequate sequential order and contemplates activities of all the phases suggested for the proposal.
	C7.3. To adapt evaluation techniques and instruments in the didactic proposal.	L1. Does not determine the technique and/or the evaluation instrument in the proposal.
		L2. Determines the technique and the instrument but without specifying all the aspects of the evaluation process of the proposal.
C7. To elaborate didactic proposals in relation to the interaction between science, technology, society and sustainable development.	C7.3. To adapt evaluation techniques and instruments in the didactic proposal.	L3. Clearly determines the evaluation technique and instrument, explicitly describing all aspects of the evaluation process of the proposal.
	C7.4. To evaluate the implementation of the proposal.	L1. Does not evaluate their practicum or does it incompletely, without reflection or omitting some section.
		L2. Evaluates their practice in a descriptive and concise way, with little reflection.
		L3. Reflects on their practicum in an analytical and deep way, identifying strengths and weaknesses and formulating suggestions for improvement.
	C7.5. To consider the influence of the natural on the social and vice versa.	L1. A CTS approach is not considered in the proposal.
		L2. A CTS approach is considered in the proposal, but without paying attention to the social conditions of the scientific-technological phenomenon.
		L3. A CTS approach is considered in the proposal, paying attention to the social conditions of the scientific-technological phenomenon and/or its social and environmental consequences.

Table 2. *Cont.*

Competences	Realization of the Competence in the Teaching Practice	Levels of Development
C7. To elaborate didactic proposals in relation to the interaction between science, technology, society and sustainable development.	C7.6. To integrate spheres for sustainable development in the didactic proposal.	L1. The proposal does not include any affective ties that promote sustainable development.
		L2. Contemplates some affective ties that can promote sustainable development in the proposal, but only in an expository way without intervention or action.
		L3. Contemplates in the proposal an affective bond that promotes sustainable development from intervention and action, respecting and caring for diversity.
	C7.7. To justify with bibliographic sources.	L1. Does not use bibliographic references to elaborate the proposal.
		L2. Uses a bibliographic reference that does not add substantial value to the proposal.
		L3. Uses one or more bibliographic references that add substantial value to the proposal.
C8. To promote interest and respect for the natural, social and cultural environment through appropriate educational projects.	C8.1. To promote attitudes of respect and care for the natural environment.	L1. Does not deal with any type of respectful attitude or care for the natural environment in the proposal.
C8. To promote interest and respect for the natural, social and cultural environment through appropriate educational projects.	C8.1. To promote attitudes of respect and care for the natural environment.	L2. Does not include any type of respectful attitude and care for the natural environment in the proposal in an isolated way, not reaching its contribution in a comprehensive and lasting way.
		L3. Incorporates respectful attitudes and care for the natural environment, deepening in its importance for a comprehensive and lasting development of these values.
	C8.2. To promote attitudes for a peaceful coexistence and respect for others.	L1. Does not tackle the social competence in their proposal or any contents related to respect for others.
		L2. Incorporates content related to social competence in their proposal, although this are limited to an action that is expected to have limited effects over time.
		L3. Incorporates the work of social competence in its proposal, anticipating repercussions over time according to the approach carried out.
	C8.3. To promote interest in their own cultural manifestations and recognition of identity.	L1. Does not include their own cultural manifestations in their didactic proposal.

Table 2. *Cont.*

Competences	Realization of the Competence in the Teaching Practice	Levels of Development
C8. To promote interest and respect for the natural, social and cultural environment through appropriate educational projects.	C8.3. To promote interest in their own cultural manifestations and recognition of identity.	L2. Includes cultural manifestations in their proposal without these implying a deep knowledge of the element and a promotion of argued interest.
		L3. Includes own cultural manifestations in their proposal, deepening its knowledge and the interest they represent for the community.
C9. To promote initiation experiences to information and communication technologies.	C9.1. To use CITs as a resource.	L1. Does not include CITs in their didactic proposal.
		L2. Includes CITs as a resource in the proposal but the students are mostly observers.
		L3. Includes CITs in the proposal as a resource and the majority of students use or manipulate them.
	C9.2. To use CITs as content.	L1. Does not include CITs in their didactic proposal as content.
		L2. Includes CITs in the proposal as superficial content.
		L3. Includes CITs in the proposal as content in a relevant way.

In the following, we shall comment on the aspects most directly involved in the realization of each of the specific competences of the module that make up the model for evaluating competences in school practicums.

If we start with the competences shared by the three areas involved, in relation to the competence "To know the scientific, mathematical and technological foundations of the curriculum of this stage as well as the theories about the acquisition and development of the corresponding learning" (C1), its realization is based on the curricular foundations (selecting, formulating and justifying the objectives, contents and evaluation criteria with the curriculum) and the learning theories (delimiting previous knowledge, establishing levels of deepening, determining and acting in the face of bibliographically justified learning difficulties) of teaching practice, being common to the disciplines. Likewise, the competence "To promote initiation experiences to information and communication technologies" (C9) revolves around the use of ICT as a resource (according to levels of participation) or as a content.

More related to mathematical knowledge, the competence "To know didactic strategies to develop numerical representations and spatial, geometric and logical development notions" (C2) is specified in the application of mathematical processes (problem solving, reasoning and proof, communication, connections and/or representation), at some point within the programming unit, to working on mathematical content (logic, numbers and operations, geometry, measurement and/or statistics-probability) and developing some skills, while "To understand mathematics as sociocultural knowledge" (C3) is formulated in relation to the association of mathematical knowledge with daily activities and to plan the mathematization of the context to teach mathematics.

The competences of social sciences are specified by including some activity around change and continuity in the proposal, showing some knowledge of first-order content (thought, customs, beliefs, etc.) for the competence "To acquire knowledge about the evolution of thought, customs, beliefs and social and political movements throughout

history" (C5), as well as incorporating events or figures with historical relevance in the teaching activity and establishing relationships between social phenomena and human activities in the environment for the C6 competence ("To know the most outstanding moments in the history of science and technology and their significance").

Finally, with more connection with the natural and experimental sciences, although not exclusively, we mainly focus on the globalization of the didactic proposal, correct sequencing and evaluation, as well as the consideration of the CTS interaction and sustainable development for the competence "To elaborate didactic proposals in relation to the interaction between science, technology, society and sustainable development" (C7); the promotion of attitudes of respect and care for the natural environment, for coexistence and respect for others, of interest for cultural manifestations and recognition of identity, in relation to the competence "To promote interest and respect for the natural, social and cultural environment through appropriate educational projects" (C8); and, finally, the inclusion of some activity that requires the use of scientific procedures and attitudes associated with experimental activities, as well as the creation of mental representations and language development, in the case of the competence "To know the scientific methodology and promote scientific thinking and experimentation" (C4).

In all cases, three levels of development have been delimited. This allows a progressive assessment of the competences specifically related to the context where they are applied.

4. Conclusions and Prospective

We started, in this work, from the intention of delimiting a model of evaluation of the didactic-disciplinary competences for the learning of natural sciences, social sciences and mathematics, within the framework of the school practicums of the degree in early childhood education. This intention was forged bearing in mind the theoretical–practical relationship of knowledge, particularly the possibility of assessing the application of competences, worked on in a more theoretical way, to the reality of teaching but within the framework of initial training.

With the previous basic idea as a basis, the aim was the configuration of a model with categories that can be measured and, therefore, to convert the intuitions that we have around the relationship between theory and practice, in training, into specific results, facilitators of possible changes and improvements.

Thus, in the configuration of the model that we have elaborated, we can recognize the influence of the main realities involved in the training that we offer a teacher: what the regulations say, what we teach in university classrooms and what they learn and apply in school practicums. In this sense, we advocate the interrelation of the different modules that make up the ECI/3854/2007 (Spanish) Order, specifying the didactic-disciplinary competences (taught in university classrooms, in a more theoretical way than we would surely like) in the way in which they would be applied in school practices (within the framework of educational centers and, perhaps, with less basic theory than we would like). In other words, we attempt to build the intermediate bridges between what, from another perspective, could be differentiated as knowledge and action [23].

Regarding the configuration of this model, we can make some observations by way of limitations and possible improvements. Firstly, the model that we propose here is conformed under general principles that allow its application to different university realities. Thus, the benchmark for the realization of competences (the design and application of a programming unit) is a shared element in the practicum plans and the delimited competences common to what could be expected from their design, implementation and evaluation. Nevertheless, and particularly in the national context, we consider the model would have to be adapted to the specificities that other curricula may include. Secondly, and in the same line, the model is designed for the degree in early childhood education. This implies that, although easy for primary education, it would have to receive modifications considering the differentiations that, at the curricular and methodological levels, occur between the stages. Thirdly, as the study is limited to the theoretical construction of a model, on the

basis of which specific instruments adapted to the particularities of each context can be designed, the analysis of the characteristics of validity and reliability [34] must be carried out at a later date. However, a thorough reflection on the definition of the theoretical construct we are dealing with, as well as the delimitation of its variables, would allow us to start from an internal validity and a theoretical construct validity for the design of any instrument [35,36].

Although the aforementioned testing of that model is needed in a next step to ensure future potentialities, it is possible to point out some benefits inherent to the formulation of the model itself. From the perspective of the teaching staff and students, we are dealing with a model that allows the construction of instruments for the evaluation of student performance during their internship period. Having a systematized model allows for a formative evaluation, throughout the period of the internship, or in the different units that make up the subject in the curricula. This involves identifying the less developed aspects in order to allow for improvement, so that the model can be used as part of self-evaluation. In addition, and ultimately, we consider it to be a useful basis for the construction of progressively more objective assessment instruments. From this point of view, the model does not have to be of a finalist nature, but its usefulness is understood as an instrument progressively applied within the framework of action research. From the perspective of university education, and in accordance with the accreditation and quality assessment requirements to which Spanish universities are subject, the model proposed can be taken as a basis for providing evidence on the assessment of the teaching given in the Higher Education Areas, as well as for reporting improvements in the syllabi in terms of what future professionals are able or not able to improve in practice. Moreover, this assessment would be contextualized, without additional practice, but in the framework of a core subject of the curriculum with specific competences in its application. Finally, from the perspective of society, it is not a question of evaluating the students but of having the assurance that we are training the professionals we want. At the end of the day, what we offer students in training will be what society will receive tomorrow.

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