

The competency-based curriculum approach. An analysis of the LOMLOE *

El enfoque del currículo por competencias. Un análisis de la LOMLOE

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Abstract:

The competency-based curriculum approach is an international focus that embodies a trait which is widely shared around the world in today's educational scenario. It is deemed a response to the challenges faced by societies today, in the era of modern globalisation and the fourth industrial revolution. In Spain, the recently passed Organic Law Amending the Law on Education (hereinafter, LOMLOE) has developed legislation that is now reaching the curriculum. Therefore, it is appropriate to analyse such legislation. This is the purpose of this paper, which describes some of the institutional history behind this curriculum reform movement; the humanistic component of the movement, which remains connected to so-called "liberal education" while broadening its perspectives, is specified; certain elements

of the ideological controversy around this new curricular approach and its rendering in the new law are described; a critical analysis of the conceptual foundations of the new structure is made and its limitations are indicated; attention is drawn to the central role of evaluation of learning outcomes and the paper ends with a succinct conclusion.

Keywords: competency, curriculum, educational reform, educational legislation, education quality.

Resumen:

El enfoque del currículo por competencias constituye una orientación internacional que encarna un rasgo del actual panorama educativo, ampliamente compartido alrededor del

* Organic Law 3/2020, of 29 December, which amends Organic Law 2/2006, of 3 May, on Education.

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mundo. Es considerado como una de las respuestas a los desafíos que, en la era de la moderna globalización y de la cuarta revolución industrial, se les plantean a las sociedades actuales. En España, la reciente LOMLOE (Ley Orgánica 3/2020, de 29 de diciembre de 2020, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación) ha emprendido el desarrollo normativo que alcanza ya al currículo. Por tal motivo, resulta oportuno proceder a su análisis. Esa es la finalidad del presente trabajo en el que se describen algunos de los antecedentes institucionales de ese movimiento de reforma curricular; se explicita la componente humanista de dicho movimiento

que no pierde su conexión con la llamada «educación liberal», aun cuando amplíe su perspectiva; se describen algunos elementos de la controversia ideológica, a propósito de este nuevo enfoque del currículo y su plasmación en el desarrollo de la nueva Ley; se efectúa un análisis crítico sobre la base conceptual de la nueva estructura y se señalan sus limitaciones; se fija la atención en el papel central de la evaluación de los aprendizajes, y se cierra el texto con una sucinta conclusión.

Descriptores: competencia, currículo, reforma educativa, legislación educativa, calidad de la educación.

1. Introduction

The competency-based curriculum approach is an international focus that, with its different nuances, embodies a trait which is widely shared around the world in today's educational scenario. It is deemed a response to the challenges faced by societies today, in the era of modern globalisation and the fourth industrial revolution.

Located between the past and the future — to paraphrase the title of the well-known essay by Hannah Arendt (2016) — education, as a secular social institution, looks toward the past in its capacity as the institution entrusted with transferring consolidated knowledge and the values that represent the common ground of cultural and moral heritage to new generations. At the same, however, it is committed to preparing for the future to serve society, which acknowledges its decisive

role while also expecting, with increasing intensity, that it will succeed in its mission and commitment.

In light of what is now known about the institutional history of that curricular reform movement, the competency-based approach effectively looks toward the future in that it represents one of the greatest contributions that education has made to preparing society to properly cope with these challenges.

As a member of the European Union and of other multilateral organisations competent for education, the Spanish educational system has not been indifferent to this movement. Ever since the first references to competencies were made in Organic Law 10/2002, of 23 December, on Educational Quality (LOCE, Spanish acronym), the successive organic laws

have addressed a competency-based curriculum approach with various degrees of detail and success. But whether due to matters of conception, implementation or both, and to the deconstructive effects on educational reforms that are now customary in the political rotation in Spain, the fact is that this movement has not taken a strong enough hold in this country.

The recent Organic Law 3/2020, of 29 December, amending Organic Law on Education 2/2006, of 3 May (referred to herein by its Spanish acronym, LOMLOE), sets out to define this movement by developing legislation that is now reaching the curriculum, in practical terms. Therefore, it is appropriate to analyse such legislation at this time. This is the purpose of this paper, which starts by describing some of the institutional history behind this curriculum reform movement. Secondly, the humanistic component of the movement, which remains connected to so-called “liberal education” while broadening its perspectives, is discussed. Thirdly, certain elements of the ideological controversy around this new curricular approach and its rendering in the LOMLOE are described. Next, a critical analysis of the conceptual foundations of the new structure is made and its limitations are indicated. Finally, attention is drawn to the central role of evaluation of learning outcomes and then the paper ends with a succinct conclusion.

2. Some institutional background

In 2001, the OECD put the final touches on the *DeSeCo* (Definition and Selection of Competencies) project, which can be

considered the starting point, at the fully institutional level, of a movement that just a few years later would provide the foundations and inspiration for a renewal in the focus of school curricula.

Two characteristic features of this project should be highlighted. The first lies in the magnitude of the corresponding effort in terms of organisation and international cooperation, moving beyond the purely academic realm of its predecessors to step into the arena of transnational politics and application thereof (Rychen and Salganik, 2006). The second consists in its field of validity, exceeding the world of school education to take root in the paradigm of *lifelong learning* (OECD, 2001a; López Rupérez, 2012).

Within this institutional context, the *DeSeCo* project would be the launching pad for the subsequent introduction of curricular reforms in developed countries, focusing on the competency approach (OJEU, 2006; Dede, 2010; Voogt & Pareja Roblin, 2012; OECD, 2018a, 2018b).

F. E. Weinert, one of the scholars that contributed significantly to the direction of the project, originally defined the concept of competency in the following terms:

The theoretical construct of action competence comprehensively combines those intellectual abilities, content-specific knowledge, cognitive skills, domain-specific strategies, routines and subroutines, motivational tendencies, volitional control systems, personal value orientations, and

social behaviours into a complex system. (Weinert, 1999, p. 10)

Later, when the final work was presented in Paris, the education ministers of the member countries summarised the concept of competency in the following terms in their declaration:

Sustainable development and social cohesion depend critically on the competencies of all of our population — with competencies understood to cover knowledge, skills, attitudes and values. (final communiqué of the meeting of education ministers, OECD, 2001b)

Through the OECD's mechanisms of influence over the European Union — it should be recalled that most of the member countries that take part in the councils and committees of the OECD are also members of the EU — this same concept and concern also prompted, strictly in relation to schools, the *European Reference Framework of Key Competences* (Official Journal of the European Union, 2006, 2018), which would spread in one way or another to the Member States (Eurydice, 2012; Voogt and Pareja Roblin, 2012).

3. Fostering a humanistic approach

Although the competency-based curriculum approach adopted by the EU owes some of its forward-looking vision to technology companies and entrepreneurs in relation to the challenges of the future (Kairamo, 1989; Voogt and Pareja Roblin, 2012), it has also inherited that broader conception of a humanistic nature set out in the four main principles of the Delors

Report (Delors et al., 1996): learning to know, learning to do, learning to live together and learning to be. This vision — part forecast, part regulation — of the education of the future has been integrated into the concept of competency mentioned above, and has inspired both the European framework and its rational justification. In fact, that approach represents an expanded conception of the strictly academic focus on education in that it includes other aspects in the curriculum, beyond knowledge, that were present in the past century but not explicitly or systematically.

In the cognitive field, the notion of competency has placed learning, and therefore also teaching, at a higher level in the hierarchy of knowledge and its use. In general, particularly in more standardised subjects, the application of knowledge requires a command of the concepts, which entails comprehending the related procedures and rules of use, without which said command is ineffective and insufficient. This expansion of the cognitive framework has been referred to as “deep learning”, or deeper learning, a concept that stems from cognitive psychology and artificial intelligence (López de Mántaras, 1989; Sawyer, 2008; Luckin and Issroff, 2018) and entails deep representations of knowledge in the student's mind. These representations feature both rich semantics and applicability (López Rupérez, 1994, 2020). As Webb (1997), among others, noted, the degree of depth of the knowledge may be expressed in a variety of dimensions, including the level of cognitive complexity of the information that students are expected to have, their capacity to transfer it to diverse situ-

ations, the ease of making generalisations or the amount of prior knowledge needed to grasp the ideas.

Shortly after the publication of the first version of the European Reference Framework of Key Competences, the Spanish Regional and National School Councils took a similar stance at their XVIII Meeting (Bilbao, 2008) in a text worth mentioning for its clarity:

(...) After all, *knowing how to do* — that ability to apply conceptual knowledge in different contexts, the development of which is characteristic of the competency-based approach — entails the mobilisation of cognitive capacities of a higher order such as analysing, interpreting, applying, predicting, etc. But these skills cannot be separated from the specific contents and learning on which they are based; rather, they should be the decanting or solidification of that conceptual knowledge without which it is simply not feasible to apply the new approach in an educational context, from the perspective of mental processes. The basic challenge consists in becoming more effective in the teaching and learning processes, in systematically creating and applying new organisational procedures and new didactic tools capable of bringing all students up to that higher level in the use of knowledge. (p. 17)

Essentially, this is also the focus taken by technology companies in their recommendations on how to prepare new generations, through education, for the challenges of the future in terms of employability, which partly explains the presence of that utilitarian component in the development of competency-based curric-

ula (Voogt & Pareja Roblin, 2012; López Rupérez, 2020).

However, beyond this pragmatic aspect related to skills, the vision of the competency-based curriculum approach extends to those other components related to attitudes and values, which actually represent an organised and systematic transfer of learning to be and learning to live together, as discussed in the Delors Report, into the school system. As described in greater detail elsewhere (López Rupérez, 2020), in recent decades this circumstance has been bolstered by at least four positive vectors of influence that, despite their diverse nature, act in a converging manner: the rise of classical moralism, the character education movement, the growing importance of non-cognitive skills and the employability demands in the 21st century.

Juan Carlos Tedesco (1995) — a well-reputed scholar and education minister from Argentina who could in no way be suspected of taking a neo-liberal approach to education — asserted the following after a profound reflection on the topic of education in the final years of the past century:

Modern companies arise as a paradigm of functioning based on full development of the best capacities of human beings. We may be facing an unprecedented situation in which the capacities needed for achievement in the productive process are the same as those required for the role of citizen and for personal development. (...) In the new production models, there is a possibility and a need to implement the same capacities as those required at the personal and social level (62-63).

Indeed, now that we are well into this present century, what we observe, from the perspective of the purposes of education, is a profound intermingling of knowledge, skills, attitudes and values, all of which are necessary in an education that can properly prepare the new generations for the future. In the end, this intermingling will serve to reassess some aspects of a “liberal education”. Liberal education in this context means an education in the fundamentals, which entails a sufficiently comprehensive approach to our cultural, intellectual and moral heritage, the development of broad frameworks of reference, respect for the facts, the ability to organise and use knowledge, a critical spirit and clear thinking, particularly in secondary education (López Rupérez, 2014).

This vision of liberal education could not be more appropriate in a context such as this one, involving swift changes, personal and social uncertainty, confusion and ambiguity; in sum, a complex scenario brought on, to a great extent, by globalisation, the digital revolution and its interactions (López Rupérez, 2021). The features of this scenario, precisely, lie at the very foundations of the justification offered by the European Union in its commitment to a competency-based curriculum approach (OJEU, 2006, 2018), invoking some of the characteristics of that liberal education that make the principles formulated in the aforementioned UNESCO report (Delors et al, 1996) feasible, namely learning to be and learning to live together.

A humanistic approach to teaching facilitates both cognitive development and the development of non-cognitive skills in the different subject matters (Kautz et al., 2014), as well as attitudes and values. In fact, the typical approach used in liberal education is essential for linking the person being educated to that person’s traditions of thought and culture and thus, to equip these individuals with personal stability, a unique direction, intellectual autonomy and a moral capacity that enable them to cope, with some certainty, within this complex, and therefore unforeseeable, new context in which they are to live. All of this highlights the extent to which different components of a competency-based curriculum approach are related to a so-called liberal education.

4. Certain elements of the ideological controversy

Ever since the first version of the European Reference Framework of Key Competences (OJEU, 2006) was outlined, certain sectors of academia in Spain have expressed their misgivings with respect to this approach due to its allegedly neo-liberal focus (Bolívar and Pereira, 2006), and have even gone so far as to disregard academicism as exclusive and selective, to mistrust curricula focused on area contents and to identify it as being responsible for the failures of compulsory education (Goñi, 2008). In line with this, they have postulated a biased approach to the notion of competency that focuses not on knowledge but on skills.

The lack of specification in the approach of the LOMLOE — as is appropriate for an organic law which is high in the hierarchy of norms — was recently resolved in its enacting legislation. Thus, the draft version of the royal decree establishing the regulation and minimum teachings in Compulsory Secondary School and its annexes (Ministerio de Educación y Formación Profesional, 2021) sets out a conception of the curriculum that is formally inspired by the European Reference Framework of Key Competences but actually stems from an appropriation of the concept of competency that places greater weight on certain personal and social skills and attitudes of a non-cognitive nature. As described on page 2 of Annex I ‘Outgoing profile of students upon completion of basic education’, these skills take on a marked prevalence that is evident in the very definition of the *Outgoing Profile*, a crucial concept in specifying the key competencies that students are expected to have acquired by the time they finish their basic education in order to “respond to the main challenges they will face throughout their lives”.

The response to these challenges, linked to the acquisition of said non cognitive learning, is, according to the legislation, what makes it necessary to have “the knowledge, skills and attitudes that lie beneath the key competencies”. However, this text, which is introductory but destined to provide general guidance for the aforementioned legislation, clearly prioritises certain skills, attitudes and values, rendering cognitive concepts sec-

ondary to certain types of personal and social learning. This denotes a certain ideological continuity with those approaches that mistrust knowledge and move away from the principles inspiring liberal education.

This approach also contrasts with the emphasis of the Council Recommendation of 22 May 2018, of the Council of the European Union (OJEU, 2018), in this regard and, in particular, with the second recommendation, most directly related to the educational system (p. C 189/4). When it comes to referring to the challenges of young people, the whereas clauses in this text by the European Union are also worded quite differently from the aforementioned draft royal decree. For example, Whereas Clause 2 states as follows:

People need the right set of skills and competences to sustain current standards of living, support high rates of employment and foster social cohesion in the light of tomorrow’s society and world of work. Supporting people across Europe in gaining the skills and competences needed for personal fulfilment, health, employability and social inclusion helps to strengthen Europe’s resilience in a time of rapid and profound change (C 189/1).

And in Whereas Clause 7, the Council reasons in the following terms:

In the knowledge economy, memorisation of facts and procedures is key, but not enough for progress and success. Skills, such as problem solving, critical

thinking, ability to cooperate, creativity, computational thinking, self-regulation are more essential than ever before in our quickly changing society. They are the tools to make what has been learned work in real time, in order to generate new ideas, new theories, new products, and new knowledge. (C 189/2)

While it is true that the definition of key competencies in the draft royal decree, of necessity, refers to the generic guidance of the European Reference Framework, the wording of the text attempts to prevent it from conflicting with the priorities of the aforementioned Outgoing Profile by offering justification worded as follows:

(...) the Recommendation refers to ongoing learning that takes place throughout one's lifetime, whereas the Profile specifies a precise, limited moment in students' personal, social and formative development: the basic education stage. (Annex I, p. 3)

The conceptual and methodological change prompted by the introduction of the new paradigm of *lifelong learning* (OECD, 2001) based on the typical focus of adult education is apparently ignored here. This concept takes into consideration all the formative stages of an individual and the interactions and interdependencies between them (López Rupérez, 2012), and gives prevalence to the European Union's approaches in terms of education.

5. Structural inconsistencies

In the aforementioned draft royal decree and Annex 1 thereto, curriculum development is divided into the following basic con-

cepts, which are formally pieced together and given the same degree of precision across the different areas, fields and subjects; they have been arranged here from more general to more specific to facilitate comprehension:

- *Key competencies*. They are defined as the “achievements that are considered essential in order for students to progress with ensured success in their formative path”, and they “entail the adaptation of the key competencies defined in the European reference framework to the Spanish educational system”.
- *Outgoing profile*. As the title indicates, this refers to the formative levels at the end of the compulsory stage. According to the official text, “the profile identifies and defines the key competencies that students are expected to have developed upon completion of this phase of their formative path”.
- *Operative descriptors* of the key competencies in basic education. These are elements “based on which the specific competencies of each area, field or subject are defined” and they embody an “applied dimension of the key competencies”.
- *Basic knowledge*. This reverts to the typical formulation of a school curriculum and, in the official text, is referred to as the “knowledge, skills and attitudes inherent to the content of a subject or field, which

must be learned in order to acquire the specific competencies”.

- *Specific competencies.* These are the achievements of the students in each area, field or subject, “which require basic knowledge so they can be accomplished”.
- *Evaluation criteria.* These aim to specify what should be evaluated. According to the official text, they are “benchmarks that indicate the levels of achievement expected of students in the situations or activities referred to in the specific competencies for each subject or setting at a certain time in the learning process”.

Despite the evident intention to give the new curriculum a structured nature, a detailed analysis of the contents of this section reveals that this aim is not sufficiently elaborated, for the following reasons:

a) An overlap between classification categories is seen that sometimes makes them hard to distinguish in practical terms. For example, the official definition of *basic knowledge* as “knowledge, skills and attitudes” is indistinguishable from the notion of competency from the perspective of both the European framework and that of the OECD (OECD 2018a, 2018b) except that, in this case, it refers to a specific subject or field. Thus, they are specific competencies. There is a conceptual circularity in the proposals that generates confusion because the competencies include basic knowledge that is, in turn, a competency. Although

the term ‘specific’ resolves the circularity issue, it does so at the expense of identifying both concepts and making them redundant. In addition, within the context of school education, including the ethical and personal dimension of competencies in the category of knowledge seems inappropriate at the epistemological level.

b) A similar situation is true for the *operative descriptors* and the *specific competencies* themselves. If the *operative descriptors* can be understood as a kind of bridge between the *key competencies* and the *specific competencies*, the fact is that these descriptors are beyond the scope of the evaluation criteria, which refer explicitly to the specific competencies.

c) These so-called *operative descriptors* provide little actual operational guidance because they are not defined with sufficient precision and therefore, they are inadequate to bear this name. For example, the operative descriptor CCL5 in Linguistic Communication Competency is described as follows:

Use their communication practices to foster democratic coexistence, managing conflict through dialogue and equal rights for all people, detecting discriminatory customs in language and abuses of power therein to encourage not only an effective but also an ethical use of language. (Annex II, p. 5)

The use of the term “operative” here generates certain conceptual confusion, bearing in mind the long tradition of

using this term, or its synonym “operational”, in education to refer to unambiguous definitions of concepts or objectives that facilitate evaluation (Bloom et al., 1971). However, in this case, the operative descriptors are much more descriptive than operational in nature.

d) The *evaluation criteria* offer mere orientation, thus rendering them difficult to interpret when it comes to unequivocally or unambiguously determining the students’ achievements by the end of the basic education stage. Thus, for example, evaluation criterion 1.1, related to specific competency 1 in the subject of biology and geology, is defined as follows:

Analysing concepts and processes related to knowledge of biology and geology, interpreting information in diverse formats (models, graphs, tables, diagrams, formulas, outlines, symbols, websites...), having a critical attitude and reaching well-founded conclusions. (Annex II, p. 21)

Moreover, their focus often makes them hard to distinguish from the focus of the *operative descriptors*.

No less relevant is the issue raised by the *outgoing profile*, as it is currently defined. According to its definition, it is linked to the conceptual genealogy of *learning standards* in the sense of unambiguous formulations of what the students must know and know how to do by the end of a cycle or stage (Pont, 2014; p. 19). The fact of the matter is that the outgoing profile is actually a set of col-

lections of operative descriptors, which are systematically mentioned at the end of the description of each specific competency. Therefore, the definition of *outgoing profile* for basic education lacks that open, barely operational, nature described above for the operative descriptors; in other words, it does not provide enough guidance and allows for a variety of assessments.

6. The issue of evaluation

The matter of evaluation is one of the problems raised and acknowledged internationally in relation to the competency-based curriculum approach (National Research Council, 2001; Gordon et al. 2009; Soland et al., 2013; Lamb et al., 2017; Vista et al. 2018; OECD, 2018b). There is broad consensus among specialists in considering that we are in the early stages of evaluation of competencies for the 21st century, or, in the words of Care et al. (2016), “our capacity to evaluate complex social and cognitive skills is in its infancy” (p. 262). However, the individual, social and political relevance entailed in educational evaluation at different stages or levels of the system makes this a core topic when creating and implementing this curricular approach in the school setting¹.

In order to accomplish the multiple purposes of evaluation, it must be valid and reliable, that is, it must measure what needs to be evaluated and it must measure it properly. These requirements of educational evaluation become a matter of justice and fairness when

the results of the evaluations are used by teachers in decision-making on handing out diplomas; obviously, this process has academic and administrative effects and an impact on the job-related and personal future in the lives of the students. However, rigorous empirical studies have shown that the constructs of competencies are weak with regard to attitudes and values (Lamb et., 2017). In fact, even the OECD itself has been forced to give up evaluating them, despite the fact that they are part of the overall framework of competencies used in the latest edition of PISA (OECD 2018a, 2018b). This reality throws into question the advisability of the approach to evaluation in the curricular development of the LOMLOE and, consequently, of certain elements of its architecture, in light of the aforementioned studies. It is as if that ambiguity in determining the students' achievements, which is typical of insufficiently defined constructs, had also extended to other well-defined ones that have been possible to evaluate in the past.

7. Conclusion

While it is true that the competency-based curriculum approach is a focus that is widely accepted as being inherent to education for the 21st century (López Rupérez, 2020; Reimers et al. 2021), there is also broad consensus as to the difficulties involved in effectively developing it: implementation difficulties arising from the fact that teachers are faced with a new, more complex and much more ambitious approach; eval-

uation issues prompted by including learning elements for which there are insufficient empirical bases and practical experience in evaluation; and difficulties in social acceptance due to the change it represents compared to a more traditional approach.

For these reasons, it would have been preferable to have a more realistic strategy that did not distort the genuine approach to the concept of competence, nor compromise the quality of education for students that would have been offered had this concept been applied correctly. A substantial portion, at least, of the criticism aimed at the curricular development of the LOMCE² (López Rupérez, 2020) is once again applicable to the LOMLOE, and it is compounded by a recognisable ideological burden that distances us from the fundamental elements of the approach in the European framework on key competences.

On the other hand, such an open approach, both in terms of *outgoing profiles* and assessment criteria, together with the extension of the competences of the Autonomous Communities in curriculum development and the flexibility of promotion and qualification criteria, will not only reduce the structuring function of basic regulations, but will most probably increase inequalities between territories in terms of the consistency of the education obtained by pupils on their way through compulsory education.

Nearly two decades after the above-mentioned reference framework was created, it is possible that we have once again strayed from the course. The future will have the final say in this.

Notes

¹ For an in-depth analysis of this issue, see (López Rupérez, 2020; chap. 6).

² The organic law prior to the LOMLOE.

References

- Arent, H. (2016). *Entre el pasado y el futuro. Ocho ejercicios sobre la reflexión política* [Between the past and the future. Eight exercises on political reflection]. Ediciones Península.
- Bloom B. S., Hastings, J. T., & Madaus, G. F. (1971). *Handbook on Formative and Summative Evaluation of Student Learning*. Mc Graw-Hill Book Company.
- Bilbao (2008). *Las competencias educativas básicas. XVIII Encuentro de los Consejos Escolares Autonómicos y del Estado* [Basic educational competences. XVIII Meeting of the Regional and State School Councils]. Servicio Central de Publicaciones del Gobierno Vasco. <https://bit.ly/32civLR>
- Bolívar, A., & Pereyra, M. A. (2006) El Proyecto DeSeCo sobre la definición y selección de competencias clave. Introducción a la edición española [The DeSeCo Project on the definition and selection of key competences. Introduction to the Spanish edition]. In D. S. Rychen & L. H. Salganik (Eds.), *Las competencias clave para el bienestar personal, social y económico* (pp. 1-13). Algabe.
- Care, E., & Luo, R. (2016). Assessment of transversal competencies: *Policy and practice in the Asia-Pacific region*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000246590>
- Dede, C. (2010). Comparing frameworks for 21st century skills. In J. Bellanca & R. Brandt (Eds.), *21st century skills: Rethinking how students learn* (pp. 51-76). Solution Tree Press.
- Delors, J. (Pres.) (1996). *La Educación encierra un tesoro*. Santillana & Ediciones UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000109590_spa
- Eurydice (2012). *El desarrollo de las competencias clave en el contexto escolar en Europa: desafíos y oportunidades para la política en la materia* [The development of key competences in the school context in Europe: challenges and opportunities for key competences policy]. Ministerio de Educación, Cultura y Deporte. <https://bit.ly/3e7jkrF>
- Goñi, J. M. (2008). *El desarrollo de la competencia matemática* [The development of mathematical competence]. Graó.
- Gordon, J., Halasz, G., Krawczyk, M., Leney, T., Michel, A., Pepper, D., Putkiewicz, E., & Wisniewski, J. (2009). *Key competences in Europe: Opening doors for lifelong learners across the school curriculum and teacher*. CASE Network Reports, No. 87. Center for Social and Economic Research (CASE).
- Kairamo, K. (Ed.) (1989). *Education for life. A European strategy*. Butterworths & Round Table of European Industries.
- Kautz, T., Heckman, J. J., Diris, R., Weel, B., & Borghans, L. (2014). Fostering and measuring skills: Improving cognitive and non-cognitive skills to promote lifetime success. *OECD Education Working Papers, 110*. OECD Publishing. <https://doi.org/10.1787/19939019>
- Lamb, S., Maire, Q., & Doecke, E. (2017). *Key Skills for the 21st Century: an evidence-based review*. NSW Government. <https://pdfs.semanticscholar.org/723e/c36a531227a534d2cec629487bbc3d1ca428.pdf>
- López de Mántaras, R. (1989). Los sistemas expertos de segunda generación buscan el 'conocimiento profundo' [Second-generation expert systems seek 'deep knowledge']. *Tendencias*, 2 (10), 3.
- López Rupérez, F. (1994). *Más allá de las partículas y de las ondas. Una propuesta de inspiración epistemológica para la educación científica* [Beyond particles and waves. An epistemologically inspired proposal for science education]. Ministerio de Educación y Ciencia. <https://bit.ly/3mikZPu>

- López Rupérez, F. (2012). La educación a lo largo de la vida en la Sociedad del Conocimiento [Life-long learning in the Knowledge Society]. *Revista de Ciencias y Humanidades de la Fundación Ramón Areces*, 7, 11-29.
- López Rupérez, F. (2014). Educación liberal y enseñanza secundaria [Liberal Education and Secondary Education]. *Nueva Revista*, 149, 18-31.
- López Rupérez, F. (2020). *El currículo y la educación en el siglo XXI. La preparación del futuro y el enfoque por competencias [Curriculum and education in the 21st century. Preparing the future and the competency-based approach]*. Narcea Ediciones.
- López Rupérez, F. (2021). *La gobernanza de los sistemas educativos. Fundamentos y orientaciones [The governance of education systems. Foundations and orientations]*. Narcea Ediciones – Stamp UCJC.
- Luckin, R., & Issroff, K. (2018). *Future of education and skills 2030: Conceptual learning*. EDU/EDPC(2018)45/ANN2. OECD. <http://www.oecd.org/education/2030/Education-and-AI-preparing-for-the-future-AI-Attitudes-and-Values.pdf>
- Ministerio de Educación y Formación Profesional (2021). *Proyecto de real decreto por el que se establece la ordenación y las enseñanzas mínimas de la Educación Secundaria Obligatoria [Draft Royal Decree establishing the organisation and minimum teaching requirements for Compulsory Secondary Education]*. <https://bit.ly/3GRsOUa>
- National Research Council (2001). *Knowing what students know: The science and design of educational assessment*. Committee on the foundations of assessment. J. W. Pellegrino, N. Chudowsky & R. Glaser (Eds.). Board on Testing and Assessment, Center for Education. Division of Behavioural and Social Sciences and Education. The National Academies Press.
- OCDE (2001a). *Analyse des politiques d'éducation [Education policy analysis]*. Éditions de l'OCDE.
- OCDE (2001b). *Comunicado final de la reunión de Ministros de Educación de la OCDE 2001 [Final Communiqué of the OECD Education Ministers' Meeting 2001]*. OCDE.
- OECD (2018a). *The future of education and skills. Education 2030*. <https://bit.ly/3J3NkTt>
- OECD (2018b). *Preparing our youth for an inclusive and sustainable world. The OECD PISA Global Competence Framework*. <https://bit.ly/3Fj5tus>
- OJEU (Official Journal of the European Union) (2006, December 30). *Recomendación del Parlamento Europeo y del Consejo de 18 de diciembre de 2006 sobre las competencias clave para el aprendizaje permanente [Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning]*. <https://bit.ly/3p940AV>
- OJEU (Official Journal of the European Union) (2018, June 4). *Recomendación del Consejo de 22 de mayo de 2018 relativa a las competencias clave para el aprendizaje permanente [Council recommendation of 22 May 2018 on key competences for lifelong learning]*. <https://bit.ly/3pcfdRA>
- Organic Law 10/2002 of 23 December 2002 on the Quality of Education (LOCE), *Boletín Oficial del Estado*, 307, 24 December 2002, pages 45188 to 45220.
- Organic Law 3/2020 of 29 December 2020, which amends Organic Law 2/2006 of 3 May on Education (LOMLOE). *Spanish Official State Gazette*, 340, of 30 December 2020, pages 122868 to 122953. <https://bit.ly/3ra9FIr>
- Pont, B. (2014). Learning standards, teaching standards and standards for school principals: A comparative study. *OECD Education Working Papers*, 99. <https://doi.org/10.1787/5k3tsjqt90v-en>.
- Reimers, F. M. (2021). *Reformas educativas del siglo xxi para un aprendizaje más profundo. Una perspectiva internacional [21st century education reforms for deeper learning. An international perspective]*. Narcea Ediciones-Stamp UCJC.
- Rychen, D. S., & Salganik, L. H. (Eds.) (2006). *Las competencias clave para el bienestar personal, social y económico*. Ed. Aljibe.
- Sawyer, R. K. (2008). Optimizing learning: Implications of learning sciences research. In *Innovating to Learn. Learning to Innovate* (pp. 45-65). OECD Publishing.
- Soland, J., Hamilton, L. S., & Stecheret, B. M. (2013). *Measuring 21st Century Competencies Guidance for Educators*. Asia Society & RAND Corporation. <https://asiasociety.org/files/gcen-measuring21cskills.pdf>

- Tedesco, J. C. (1995). *El nuevo pacto educativo [The new education pact]*. Anaya.
- Vista, A., Kim, H., & Care, E. (2018). *Use of data from 21st century skills assessments: Issues and key principles*. Center for Universal Education at the Brookings Institution. <https://brook.gs/32ipz9e>
- Voogt, J., & Pareja Roblin, N. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal of Curriculum Studies*, 44 (3), 299-321.
- Webb, N. L. (1997). *Criteria for alignment of expectations and assessments in mathematics and science education*. Research Monograph 8. Council of Chief State School Officers and National Institute for Science Education.
- Weinert, F. W. (1999). *Concepts of competence. Definition and selection of competencies. Theoretical and conceptual foundations (DeSeCo)*. OECD/SFSO/NCES.

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