

## Competency-Based Curriculum As A Strategy For STEM Education In The 21<sup>st</sup> Century

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### *Abstract*

The current educational system is governed by a common curriculum that is adapted to the times, spaces, cultures, and societies that have been defined over time. The main objective of this work is to analyze the different changes that the curriculum has undergone throughout the different educational laws in Spain, to subsequently analyze the curriculum by competencies as a promoter of STEM education in the schools of the 21st century. This study responds to a qualitative research model, which analyzes the situation of Spanish curriculum design and development in the Organic Law 2/2006 on Education (LOE), Organic Law 8/2013, of December 9, for the improvement of educational quality (LOMCE), and Organic Law 3/2020, which amends the Organic Law 2/2006 on Education (LOMLOE), educational laws in the Spanish context through a comparative study, to establish the evolution of curriculum policy and how the curriculum by competencies favors STEM education in schools. Competency-based education aims to achieve a comprehensive education for all students throughout all educational stages and from all areas of knowledge, promoting equity and ensuring that no student is left behind. This curriculum promotes mathematical competence and Science and Technology (STEM), providing students with an understanding of the world using the scientific method, mathematical and technological thinking, and representation, in addition to transforming the environment in a committed, responsible, and sustainable way. Among the challenges that the Organic Law 2/2006 on Education (LOMLOE) aims to address, we can see the improvement of the competence level of all students to increase STEM vocations, especially among girls. The new curriculum aims to focus more on competencies and less on memorization by integrating the STEM approach for the transformation of the environment in a responsible, sustainable, and sustained manner. Incorporating a competency-based curriculum in schools can be a transformative approach to education, offering numerous benefits for both students and the education system. However, successful implementation requires careful planning, teacher training, and ongoing assessment and improvement.

Index Terms: competency-based curriculum, curriculum design, STEM competence, educational legislation.

## Introduction

Leadership In Spain the current educational system is governed by a common curriculum that is adapted to the times, spaces, cultures, and societies that have been defined over time. With this work we intend to analyze the changes in the curriculum along the different educational laws in Spain, being these the Organic Law 2/2006 on Education [1], Organic Law 8/2013, of December 9, for the improvement of educational quality [2], and Organic Law 3/2020, which amends the Organic Law 2/2006 on Education [3]. This is because the Spanish educational system has gone through many changes always influenced by a specific ideology that can have an impact on the changes in the educational laws and in this case, in the curriculum.

The curriculum is a great element for education as it is the one that governs how it should be, that is why we want to solve throughout this research what contributions through the latest educational laws can help to improve society and what improvement plans we can carry out for a common good in the educational system.

It is important to consider the great influence of politics in the change of the different education laws. That is why in this paper we analyze the curriculum in the Organic Law 2/2006 on Education (LOE), proposed by the socialist party. Then we analyze the meaning of the curriculum in the Organic Law 8/2013, of December 9, for the improvement of educational quality (LOMCE), a mercantilist and neoliberal law seen from a more traditional and conservative vision. Finally, the current education law, Organic Law 3/2020, which amends the Organic Law 2/2006 on Education (LOMLOE).

The main objective of this work is to analyze the different changes that the Spanish curriculum has undergone throughout the different educational laws, to subsequently analyze the CBC as a promoter of STEM competence in the schools of the 21st century. In this way, it is intended to answer the research question: has the current curriculum incorporated changes throughout the educational laws to favor STEM education?

## State of art

### Competency-based curriculum

Competency-based curriculum (CBC) has emerged as a prominent framework in the field of education. This paper presents a comprehensive review of CBC, encompassing its historical foundations, key principles, implementation strategies, benefits, challenges, and future directions. By synthesizing the work of notable authors, it seeks to offer a clear understanding of the current state of CBC in education.

CBC is an educational approach that prioritizes learner-centered outcomes, continuous assessment, and personalized learning pathways. It has garnered significant attention from educators, policymakers, and researchers in recent years.

CBC's roots can be traced back to the mid-20th century, with significant contributions from authors such as

Although STEM integration is receiving increasing emphasis in many curriculum documents and policy reports, there appears inadequate research that yields substantive evidence of desired learning outcomes. Existing studies of integrated STEM education rarely document in sufficient detail the curriculum or program being implemented including the nature of the integration and ways in which it was supported. The form of evidence collected to demonstrate whether the intervention goals were achieved is also frequently lacking [4].

Benjamin Bloom. In Bloom's Taxonomy of Educational Objectives [5], he laid the groundwork for defining educational outcomes and the importance of mastery in learning. This taxonomy became foundational in CBC, emphasizing the need for clear, measurable competencies.

CBC is built upon several key principles, including competencies as learning outcomes, mastery-based progression, personalization, and continuous assessment [6]. Robert J. Marzano, an influential author in the field of education, stressed the significance of standards-based grading and assessment in competency-based systems. He argued that clearly defined learning targets are essential for effective CBC implementation.

In the realm of K-12 education, Susan M. Brookhart's work on formative assessment [7] has been instrumental in shaping CBC practices. Formative assessment aligns with CBC's focus on continuous assessment and providing timely feedback to support student growth. Additionally, the CompetencyWorks initiative, a collective effort led by American education leaders, has produced numerous resources and publications offering guidance on CBC implementation [8].

CBC offers a range of benefits, as highlighted by Clayton Christensen, a renowned author known for his work on disruptive innovation in education. Christensen advocated for personalized learning and the integration of technology to facilitate CBC [9]. These benefits include improved learning outcomes, greater flexibility, real-world relevance, and the promotion of lifelong learning [10].

Looking ahead, CBC will continue to evolve in response to advancements in technology and globalization. Digital transformation, as discussed by Khan [10], will play a pivotal role in the future of CBC. As educators and policymakers continue to explore and refine CBC models, ongoing research and evaluation will be essential [8]. Advocacy efforts will persist to promote policy changes that support CBC implementation [9].

### Curriculum design and innovation

The concept of curriculum has been the subject of much debate in the 20th century. In its broadest sense, it is synonymous with the educational process as a whole and its social determinations.

The reasons for this diversity arise, in the first place, from the need to understand the curriculum as a value-biased concept [11], which means that there is no social consensus on the subject, since there are different options as to what it should be. Secondly, because it encompasses a broad scope of educational reality, which implies the need to situate its analysis at different levels. Moreover, every conception of the curriculum carries a political meaning, which concerns questions about who should make the decisions and what should be the role of the different agents involved.

In its processual dimension, we have distinguished a set of development processes such as initiation, development and implementation, institutionalization, and evaluation. Moreover, in its practical development, the curriculum is something fluid and dynamic that is being reconstructed by a set of agents (teachers, students) and contexts (centers and classrooms), so that it can be said that it never works in a linear way, but in an invertebrate or fragmentary way [12].

The term "curriculum" is of recent use in Spanish; it is from 1983 onwards when it becomes generalized in our context, ending in 1989, with the imposition of a certain "curricular orthodoxy", that is, a particular and unique way of understanding curriculum design and development [13].

According to Marhuenda [14] there are many definitions of curriculum, as well as the classifications into which these definitions have been organized (Gimeno [15, 16, 17], Jackson [18] Angulo & Blanco [19], Pinar et al. [20]. From all of them we can deduce not only the variety of perspectives that exist on the curriculum, but also the confusion regarding what the curriculum itself represents. Moreover, as Zabalza [21] points out, the lists of curriculum definitions and their taxonomies have not contributed to the improvement of school practice, nor, in the case of Spain, has the profusion of literature on the curriculum and the official use of jargon proper to the field of didactics; that is, the political appropriation of teaching terminology.

Grundy [22] differentiates between two meanings of the latter, product, and praxis, while distinguishing between a conceptual approach in which the curriculum is seen as intention, as design, and a cultural approach in which it denotes its condition as a social construction, as an event or experience that has taken place. Through this distinction, Grundy tries to make explicit the interactive character of the curriculum, which for her derives from the fact that while some elaborate it, others receive and use it. This is a way of approaching the term that has great potential, since it recovers for the curriculum the interactive dimension that it seemed too many to lack and which, nevertheless, teaching does possess.

As Stenhouse [23] points out, the study of the curriculum is essentially concerned with the relationship between its two meanings: as intention and as reality. The definition offered by Stenhouse seeks to reduce the distance between its condition as an intentional proposal and its practical realization, understanding it as a possibility open to research. That is why he defined it as "an attempt to communicate the principles and essential features of an educational purpose in such a way that it remains open to critical discussion and can be effectively translated into practice".

Every educational system is based on a specific curriculum, which responds to the goals and objectives that guide the type of person to be educated; it is up to the teacher to operationalize the curriculum in the work he/she carries out with the students in the classroom [24].

Throughout time, there have been different contextualization in terms of curriculum matters, so that Tadeu [25], believes that the curriculum has consensual definitions, being the product of exchanges between various subjects of the educational process, and in turn considers state regulations and the weight of its determinations with respect to the sociocultural context in which it interacts. Gimeno and Pérez [26] state that "pedagogical thinking on the curriculum is very heterogeneous and dispersed, and we can even find positions that disregard the analysis and decisions on content, pretending only to provide outlines of how to organize and manage it by teachers" [27].

These definitions are differentiated, depending on the orientation, objectives, and purposes of which it is the object at each moment in history.

Bossing and Solari [28] see the curriculum as the fundamental aspect that allows the child to appropriate the knowledge that is generated. Tyler [29] had already exposed the curriculum as a valid experience that implies the adoption by the teacher of an objective and dynamic evaluation system in the different moments of the teaching and learning process of the learner.

On the other hand, Stenhouse [30] establishes curriculum analysis and planning, with a project vision structured by principles for the selection of content, development of a teaching strategy, decision making regarding the sequence or diagnosis of students; it is also based on an empirical study and on the evaluation of student and teacher progress, an orientation to implement the curriculum in different contexts, understanding it as intention on the one hand and as reality on the other, and it is the curriculum that seeks the relationship between both, this being the curricular problem.

## **METHODS**

Design

This study responds to a qualitative research model, which analyzes the situation of curriculum design and development in the LOE, LOMCE and LOMLOE educational laws in the Spanish context through a comparative study, to establish what lines of curriculum policy these laws follow. Next, the curricular model proposed by the LOMLOE was analyzed and how it favors the development of STEM education in schools in the 21st century.

#### Procedure

The methodology followed in this study is based on the deductive comparative method which, starting from the model presented by G.F. Bereday and F. Hilker, later incorporated the contributions of García Garrido [31], among others. This methodology consists of the description and explanatory analysis of the data corresponding to the units of comparison and the juxtaposition of data, where the similarities and differences between the curricular design and development in the different laws under study are investigated.

#### Materials

The materials used for the collection of information were educational legislation, definition of curriculum, contents and competences of region, early childhood education, elementary school, high school, bachelor, and curricular diversification. The materials have been extracted from the legal texts of the LOE, LOMCE and LOMLOE.

#### Unit of analysis

As for the unit of analysis, the comparative method will be developed through the criteria based on which the compiled material will be compared: definition of curriculum, contents and competencies Spanish regions, childhood education, elementary school, high school, and curricular diversification. Finally, the competency-based curriculum model proposed by the LOMLOE will be analyzed.

Once all this information has been collected, the data obtained through the juxtaposition and interpretation phase are presented to draw conclusions that allow us to compare the curriculum in the laws that are the object of this study and to formulate proposals for improvement. The sources of information used have been, mainly, primary sources, from different newspapers and official bulletins for the search of all the normative information. As well as secondary sources, publications, documents, reports, studies, and official web pages, as well as the Department of Education and Vocational Training.

As for the temporal delimitation, the data have been extracted during the first semester of 2023.

## RESULTS

Contextualization of educational legislation

*The curriculum in the LOE*

The Organic Law (LOE) 2/2006, of May 3, 2006, on Education is a state organic law approved on April 6, 2006, in the Congress of Deputies. This law offered a modern and demanding regulatory framework, combating school failure, and promoting social cohesion. It also respects the competences of the different Autonomous Communities with adequate financial backing.

This law was supported by the political parties PSOE, ERC, PNV, IU-ICV and CC and aims to improve the attention to diversity and resources for students with learning difficulties and guarantees for the private initiative, mostly of Catholic ideology, the status of Public Service and confessionalism of the whole System, a situation long desired by the Catholic right wing.

In 2006, Spain was governed by the Spanish Socialist Workers' Party, with José Luis Rodríguez Zapatero as President of the Spanish government, and María Jesús San Segundo as Minister of Education. She conceived education as a public service, although she put public and private schools on the same level and supported them with the same resources. Thus, to a certain extent, the constitutional principle of general planning of education, as a right to education for all, is abandoned.

After the document "A quality education for all and among all" and with all the proposals, they begin to elaborate an educational law, the LOE, where they identify three fundamental principles [32]. The first is to provide quality education to all citizens, at all levels of the education system: to improve overall results and reduce the rates of completion of basic education without a degree; the second is the need for all components of the educational community to collaborate to ensure that the first principle is fulfilled. The principle of effort must be applied to all members of this community, as families must commit themselves to their children's work and life in schools, schools and teachers must strive to build equitable and quality learning environments, educational administrations to facilitate the fulfillment of functions, society will have to support the educational system. The third principle is a commitment to the educational objectives set by the European Union, in which some of these objectives are: to improve the quality and efficiency of education and training systems, to facilitate widespread access to education and training systems, to open these systems to the outside world.

The curriculum in the LOMCE

This law is approved in 2013, the Organic Law 8/2013, of December 9, for the improvement of educational quality was proposed by the Popular Party, being born from a delicate socioeconomic context. As president of the government was Mariano Rajoy and as minister of education José Ignacio Wert.

With the LOMCE they intend to achieve in Spain the universalization of education, in which they achieve the constitutional right to education and

to a compulsory and free basic education. Looking at the data, once the above is overcome, an improvement in the quality of education is achieved in terms of improved student performance, since its objective is to develop each student's potential to the maximum. Therefore, and looking at the context, more attention is paid to the diversity of students' talents, offering more individualized attention and more flexible trajectories, increasing the level of demand, and encouraging effort through standardized evaluations.

It tries to reduce and put solutions to the problems not only educational, but also social and economic that plague the country. In this climate the government is forced to implement a series of policies that in many cases consist of reducing the general budgets and economic items of various sectors, as is the Education sector, consequently, of the country's economy and the ideology of the ruling party [33].

It is a law influenced by an economic movement, derived from globalization, neoliberalism and where one objective is to grant greater freedom to companies and markets, often to the detriment of the public sector. In this way, there is a greater involvement of charter schools as opposed to public schools, reducing the influence and power of the public sector.

In the LOMCE they take the students as the center and the reason for education, so that they become autonomous, critical, and self-thinking people, therefore, they want to make education the main instrument of social mobility, so that it can help to overcome economic and social barriers and generate aspirations and ambitions. They see students with talent, but who need the necessary mechanisms that the education system has to offer them to recognize and promote it, and the logic that they want to show with this reform is that there is an evolution towards a system capable of channeling students towards the most appropriate trajectories for their abilities. They also relate the level of education that citizens have with their ability to compete successfully on the international scene (jobs). Another of their objectives is to introduce new patterns of behavior that place education at the center of society and the economy. They want to improve the quality of the education system, as this will lead to an improvement in the democratic quality of a community. They believe that cognitive skills are not enough and therefore, from an early age, transversal competencies such as critical thinking, creativity and diversity management must be acquired.

Economic investment has had a direct impact on education, where cuts are directly related to the reduction of teaching staff. Globalization is also influenced, giving importance to companies and the private sector favoring their own interests and where education is directly focused on the importance of results, regardless of the process.

The curriculum in the LOMLOE



This last law, Organic Law 3/2020 of December 29th, which modifies the LOE of 2006, is currently the new law governing the Spanish education system. It was promoted by the two left-wing political forces of the government PSOE and Unidas Podemos, receiving additional support from minority parties.

The year this law was published, in 2020, the Spanish Socialist Workers' Party (Partido Socialista Obrero Español) was governing Spain, with Pedro Sánchez as President of the Government and Isabel Celaá as Minister of Education.

The LOMLOE is based on the LOE but also makes mention of the LOMCE, in which they see a rupture of the balance reached by the LOE between visions and approaches to education and living together in a democratic and plural system, since it modified some objectives that were proposed by the European Union and UNESCO to improve the quality and effectiveness of education and training systems; it also developed a curricular model based on the differentiation of core, specific and free configuration subjects, among others. This law received a lot of criticism, and many educational agents requested its reversal.

The purpose of this law is to establish a renewed legal system that increases educational and training opportunities, that contributes to the improvement of students' educational results and that complies with the generalized demand of Spanish society for quality education for all, in addition to children's rights, a gender equality approach, a focus on sustainable development as established in the 2030 Agenda, taking into account new technologies, reinforcing equity and the inclusive capacity of the system.

The LOMLOE introduces improvements by rescuing the Organic Law of Education of 2006 and repealing the LOMCE and its Catholic, conservative, and populist stance. In this way, some of the changes produced by the LOMLOE is the vehicular language, where it does not determine that Spanish is the vehicular language in education; however, this aspect is controversial because Spanish disappears as the official language in the field of education and where there would be a contradiction to the Constitution.

Regarding subsidized education, it is based on the principle that public education must be the backbone of the educational system and where the regulation of subsidized education is rejected, putting an end to the ideal of segregated education. Special education will take on great importance in this legislative framework and the integration of "diversity" in ordinary schools is a priority. Gender equality will be a cross-cutting element in all subjects.

As for the curriculum, we will go into the matter later. The law grants an important role to the educational centers, being able to determine the curriculum in a percentage to be established by the autonomous

communities and which will be deducted from that which corresponds to them. It also opens the possibility of grouping the subjects of the curriculum into areas of knowledge.

**EVOLUTION OF THE CURRICULUM: FROM LOE TO LOMLOE**

In this section we will analyze how the curriculum is developed in the LOE, LOMCE and LOMLOE in their legislative documents, and we will discuss the changes between them.

**Table 1. Evolution of the curriculum in LOE, LOMCE and LOMLOE**

	LOE	LOMCE	LOMLOE
Definition of curriculum	The curriculum is understood as the set of objectives, competencies, contents, pedagogical methods, and evaluation criteria of each of the teachings regulated by this Law.	The curriculum is understood to be the regulation of the elements that determine the teaching and learning processes for each of the teaching programs.	The curriculum is understood as the set of objectives, competencies, contents, pedagogical methods, and evaluation criteria of each of the teachings regulated by this Law.
Contents and competences of the Autonomous Communities	In order to ensure a common training and guarantee the validity of the corresponding degrees, the Government, after consulting the Autonomous Communities, shall establish, in relation to the objectives, competences, contents and evaluation criteria, the aspects.  basic curriculum, which constitute the minimum	Limited decision-making capacity of the Autonomous Communities in the regulation of subjects, methodologies, diagnostic evaluations for educational improvement, the organization of teaching, as well as in matters of	The distribution of competences between the State and the Autonomous Communities regarding the basic contents of the minimum education is recovered, which will require 55% of the school timetables for the Autonomous Communities that have a co-official language and 65% for those that do not.

	teaching requirements.	promotion and qualifications.	
Curricular diversification	<p>The objectives of the stage and the corresponding competencies will be achieved with a specific methodology through an organization of the curriculum in areas of knowledge, practical activities and, where appropriate, subjects, different from that established in general.</p> <p>The definition of the minimum teachings of the stage will include the basic conditions to establish the diversifications of the curriculum from the third year of</p>	<p>Article 1.18 establishes the "learning and performance improvement programs" that replace the previous curricular diversification programs.</p> <p>The Government will define the basic conditions for establishing the requirements for learning and performance improvement programs from the 2nd year of Compulsory</p>	<p>According to Article 27, the Government and the Educational Administrations will define, within the scope of their respective competencies, the conditions for establishing the modification and adaptation of the curriculum from the third year of compulsory secondary education, for those students who require it after the appropriate assessment.</p> <p>The curricular diversification programs will be oriented to the attainment of</p>

	<p>compulsory secondary education, for students who require it after the appropriate evaluation.</p>	<p>Secondary Education.</p>	<p>the Compulsory Secondary Education Graduate Degree, by those who present relevant learning difficulties after having received, if applicable, support measures in the first or second year, or those for whom this measure of attention to diversity is favorable for the attainment of the degree.</p>
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In the three laws we are analyzing, the definition of curriculum is made in the same way in the socialist laws (LOE, LOMLOE) with the same definition in the first clause of article 6: "For the purposes of the provisions of this Law, curriculum is understood as the set of objectives, competencies, contents, pedagogical methods and evaluation criteria of each of the teachings regulated in this Law".

In the LOMCE we can see the following definition: "For the purposes of the provisions of this Organic Law, curriculum is understood as the regulation of the elements that determine the teaching and learning processes for each of the teachings".

In the LOE there is a slight mention of public education, because although there is a progressive increase in public places, an obstacle that was put in the way was not to control the privatization of education of the right; thus, in the LOMCE the term public education is not even mentioned, because it is based on a market education where the public takes a back seat and the individual and private sector takes precedence. In the new educational law, LOMLOE, there is a strengthening of the infant cycle in education.

Regarding democracy and participation in the centers, in the LOE most representatives to elect the director or a figure of authority is reduced only to representatives of the center in the commission. By this, we mean

that most representatives were among the teaching staff and the management team, but families and students were not included. In the same way, in the following law, LOMCE, even the competences of the school council are even more limited than in the previous law.

Moving on to the field of the agents involved and diversity, we move on to talk about coeducation, being so that in the LOE, there is a part of responsibility for equality in the school board, however, it does not give it the sufficient importance that it should have to fight for gender equality in the educational field. Thus, the LOMCE does not even mention the issue of coeducation, because as it is known, the conservative and traditional character does not opt for gender equality.

It is no less important to mention the issue of evaluation in our review of the differences between the educational laws (LOE, LOMCE, LOMLOE). Thus, in the LOE, the evaluation of diagnostics is carried out without ranking of centers. This avoids comparisons between educational centers and reports that place the different educational centers on a comparative scale. It is in the LOMCE where this interest in rankings and results appears, giving rise to a mercantilist vision of education and where evaluations will be carried out at the end of the cycle from primary to ESO. This gives rise to competition between centers that ends up favoring the private sector and adopting a neoliberal vision of education. As we can intuit, in the LOMLOE, it is decided to avoid competitive evaluations and the ranking of centers, so evaluations are carried out for diagnosis to establish improvement plans, that is, it is no longer a concern for the results, but it considers the learning process.

The curricular design of each law is given by the ideology of the dominant party at the time. The current LOMLOE law is the first time that introduces the principles and values of sustainability and against bullying, a factor that defines this law once again as the most involved for social change and the good of all, since neither in the LOE, nor in the LOMCE there is no mention of these principles.

#### COMPETENCY-BASED CURRICULUM AS AN ANABLER OF STEM EDUCATION

In the LOMLOE we can see how it refers to a competency-based teaching model that is largely adjusted to this changing society we are living in now, since competencies do not only refer to the knowledge that students must acquire, but also to the skills, abilities, attitudes and values necessary to create a complete profile of students at the end of each of the educational stages, to form an active and committed citizenry with the society in which they will live.

On the other hand, according to the curriculum reform within the framework of the LOMLOE, curricular models that base success exclusively on the acquisition of learning in a structured and inflexible manner leave part of the student body outside the system and,

consequently, favor failure and prevent true inclusion, which translates into high rates of repetition and early school dropout. On the contrary, a competency-based curriculum invites flexible and inclusive methodological and assessment approaches, capable of responding to very different student profiles and favoring inclusion.

It is necessary to consider that competency education aims to achieve a comprehensive education for all students throughout all educational stages, and from all areas of knowledge, favoring equity and ensuring that no student is left behind. This implies that the acquisition of competencies is gradual and integrative. Developing competencies allows those who acquire them to have the ability to cope in different situations, sometimes complicated, that arise in society. Thus, we can say that competency-based teaching is the most appropriate model to ensure that students relate the concepts they learn with the applications they have in their daily world.

In short, the competency-based curriculum is a flexible and dynamic model that adapts relatively easily to change. It also facilitates attention to the needs of heterogeneous students, which favors their well-being and success at school and thus helps to reduce repetition and dropout. Its competency-based assessment model is a key element for inclusion and school success. Moreover, it is aligned with the most reliable international guidelines and with the countries of our environment, which favors convergence between European education systems.

Lastly, the LOMLOE increases the number of female students in STEM careers and gender equality in teacher training. That is why, in the new educational law, the LOMLOE, a curriculum with meaning and value is intended, which adapts to the new demands and social needs, with a horizon directed towards the European education framework of 2030, which opens the curiosity of the students, which collects the contributions of the educational community, ie, that it is a deliberative and critical curriculum, equitable, that responds to an inclusive school capable of observing and attending to all talents, that is based on scientific evidence such as the successful educational examples of other countries, that contains challenging and meaningful contents, that mistakes are not understood as a lack but as a source of learning.

## **RESULTS**

Competency-based curriculum has transformed education by focusing on learner-centered outcomes and personalized learning. Prominent authors such as Benjamin Bloom, Robert J. Marzano, and Clayton Christensen have contributed significantly to the theoretical foundations and practical applications of CBC. While challenges exist, the potential benefits, including improved learning outcomes and adaptability, make CBC a valuable approach in the ever-evolving educational landscape. The future of CBC holds promise, driven by digital transformation and continuous improvement efforts led by educators, researchers, and policymakers.

Throughout the three educational laws, it has been observed that the LOE began to make important changes in terms of conceiving education as lifelong learning that develops throughout life and, therefore, citizens should have the possibility of training within and outside the educational system, in order to acquire, update, complete and expand their capabilities, knowledge, skills, abilities, aptitudes and competencies for their personal and professional development. However, with the arrival of the LOMCE, education became more focused on regulating learning and knowledge, that is, on offering results, on effectiveness and efficiency and not on learning to learn. And finally, in the LOMLOE, in which the aspects of the LOE are rescued, since in the LOE the integral development began to be highlighted, but it was not put into practice, therefore, in the LOMLOE it is tried once and for all to make a curriculum according to inclusive education and trying to emphasize the importance of putting into practice and developing future generations in learning according to reality, that is, in a learning close to society.

The LOMLOE is committed to putting into practice once and for all what was written in the LOE, with important changes with respect to the LOMCE, such as an education for citizenship, an inclusive curriculum, a curriculum in line with reality, considering the SDGs and sustainable development.

A new curriculum must be thought from a systemic approach, where learning takes place throughout life; there is a multiplicity and diversity of contexts; there is a generalization of new technologies; and an acquisition and development of the competencies involved in the ability to learn. The curriculum must therefore have autonomy and flexibility, counting on the support of teachers and creating a real support to the school as an institution and as a social organism.

The current education law we have in Spain is based on an educational model in which learning is given by competencies, to favor multidisciplinary approaches, and is committed to working on eight competencies endorsed by the Sustainable Development Goals of the 2030 Agenda. It sets the educational framework for the development of a new curriculum model in relation to the acquisition of competencies, but which is also open, flexible, with a manageable and better integrated structure, serving an inclusive education and valuing diversity.

We no longer speak of objectives but of competencies as goals to be reached, nor of teacher methodologies but of student learning experiences, nor of evaluation but of rubrics, nor of content but of active methodologies that are enriched with skills and attitudes.

The Ministry of Education and Vocational Training (MEFP) began work on the design of the new curriculum around its central element, the Basic Education Exit Profile, which identifies the key competencies that all students should have developed and acquired by the end of compulsory education.

A competency-based curriculum does not only imply a change in administrative regulations. It implies a cultural change, a change of code, of the operating system in society, in the centers and in the professional capacity of teachers. Curricular reform requires time, but at the same time it must be undertaken immediately. We address the importance of the school based on trust and, as we mentioned at the beginning, we do it from a systemic viewpoint.

## **CONCLUSIONS**

Competency-based curriculum (CBC) offers numerous benefits for schools and students alike. Here are some of the key advantages of implementing a competency-based curriculum at schools:

1. **Personalized Learning:** CBC allows students to progress at their own pace. It recognizes that students have different learning speeds and styles, enabling them to move forward when they have skills a particular competency. This personalization can lead to a deeper understanding of the material.
2. **Higher Student Engagement:** CBC often involves more interactive and project-based learning experiences. Students are more engaged when they can see the real-world relevance of what they are learning, which can lead to increased motivation and enthusiasm for learning.
3. **Clear Learning Objectives:** CBC defines clear and specific learning outcomes for each competency. This clarity helps students understand what is expected of them and what they need to achieve, reducing ambiguity in the learning process.
4. **Improved Retention and skills:** Students in CBC programs tend to retain information better because they are encouraged to consolidate each competency before moving on. This depth of learning can lead to a more solid foundation of knowledge.
5. **Flexibility:** CBC offers flexibility in terms of time and location. Students can learn at their convenience, making it suitable for both traditional classrooms and online or blended learning environments.
6. **Adaptation to Diverse Learners:** CBC allows for differentiation to accommodate diverse learning needs. Students who need extra support can receive it without feeling rushed or left behind, while those who are getting them can advance quickly.
7. **Real-World Skills:** CBC often emphasizes practical, real-world skills and competencies that are directly applicable to students' future careers. This prepares them for success in the workforce or higher education.
8. **Continual Assessment:** CBC promotes ongoing assessment, allowing teachers to provide timely feedback to students. This feedback loop helps students identify areas where they need improvement and make necessary adjustments.



9. Alignment with 21st-Century Skills: CBC can align with the development of 21st-century skills, such as critical thinking, problem-solving, collaboration, and communication, which are highly valued in today's society and workforce.

10. Data-Driven Decision Making: CBC often involves the collection of data on student performance. Schools can use this data to make informed decisions about curriculum improvement, instructional strategies, and student support.

11. Preparation for Lifelong Learning: CBC instills a sense of lifelong learning by encouraging students to take responsibility for their own learning. This prepares them to adapt to changing circumstances and continue learning throughout their lives.

13. Parent and Community Engagement: CBC can foster increased engagement from parents and the community, as they can better understand what students are learning and the progress they are making.

14. Cost Efficiency: While there may be initial investments in developing CBC programs, in the long run, they can be cost-efficient because they minimize the need for repeating courses or grade levels due to students advancing based on mastery.

15. Global Competitiveness: Preparing students with a strong skill set and a deep understanding of core competencies can enhance a nation's competitiveness on the global stage.

Incorporating a competency-based curriculum in schools can be a transformative approach to education, offering numerous benefits for both students and the education system. However, successful implementation requires careful planning, teacher training, and ongoing assessment and improvement.

In short, in response to the research question, we can affirm that the arrival of the LOMLOE has brought about a great change in curriculum design, making it more inclusive and more conducive to STEM competence. The curriculum does not only encompass what its definition provides, but it is a broad term that encompasses all the agents related to education. Through this new curriculum design, or rather, recovered and updated to a common and collective society, the social and democratic values of the LOE are taken up again.

In summary, STEM competence is not only valuable for personal and career development but also critical for addressing the complex challenges of the 21st century. It empowers individuals to contribute to scientific discovery, technological innovation, and the betterment of society.

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