

A Methodology for Curriculum Design in General High School in México

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Abstract

The transition to the Common Curricular Framework for Upper Secondary Education (MCCEMS, as its acronym in Spanish) in Mexico, established in AGREEMENT number 09/08/23, emphasizes the use of Learning Progressions as a central element of curricular design. This research aimed to develop a methodology for constructing context-sensitive learning progressions aligned with the MCCEMS. A descriptive approach with a non-experimental design was employed, based on the analysis of the curricular model developed by the Undersecretariat of Upper Secondary Education (SEMS, as its acronym in Spanish). As a result of this research, a methodology structured into eight phases was developed, drawing from the artistic paradigm of curricular design. To date, this methodology has been implemented in 49 Curricular Learning Units (CLU) within the General High School curriculum, impacting more than 27,000 students in institutions coordinated by the General Directorate of Baccalaureate (DGB, as its acronym in Spanish). Future research should focus on evaluating its impact throughout the three years of student education in the General High School program.

Keywords: curriculum design, upper high school, learning progressions

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Introduction

The upper secondary education system in Mexico, known as “*bachillerato*” in Spanish, is part of the broader framework of Upper Secondary Education and is aimed at students between the ages of 15 to 18, with an official duration of three years. This educational level is organized into various subsystems according to their formative approach. In the case of the General Upper Secondary Education, the main goal is to prepare students for higher education. Although upper secondary education is mandatory and regulated by the Ministry of Public Education (*Secretaría de Educación Pública*, SEP), there are also autonomous and private institutions that follow their own academic programs.

Within this context, Agreement number 09/08/23, published in the Official Journal of the Federation on August 25, 2023, establishes and regulates the adoption of the Common Curricular Framework for Upper Secondary Education (*MCCEMS*, as per its Spanish acronym) (*Secretaría de Educación Pública*, 2023). This framework is the result of a collective and collaborative project initiated in 2019, involving the participation of teachers, authorities, and experts who contributed to defining the principles of a comprehensive education for this educational level (*Subsecretaría de Educación Media Superior*, 2022, 2024).

The MCCEMS seeks to unify the fundamental learning outcomes across Upper Secondary Education, promoting greater equity and flexibility in student formation (*Subsecretaría de Educación Media Superior*, 2019). To this end, it sets forth the pedagogical principles, curricular structure, and graduate profile that guide the educational process. The fundamental curriculum is organized into 27 Curricular Learning Units (CLU), distributed across three Areas of Knowledge (Humanities; Social Sciences; and Natural, Experimental Sciences and Technology), as well as five Sociocognitive Resources (Mathematical Thinking; Language and Communication; Historical Awareness; Digital Culture; and English).

In addition, the MCCEMS highlights Learning Progressions as a central element of curricular design, enabling the structured, gradual development of knowledge and skills throughout upper secondary education. In accordance with the Fourth Transitory Article of Agreement 09/08/23—which assigns the Undersecretariat of Upper Secondary Education (SEMS) the responsibility of coordinating the necessary actions for the implementation of the framework in institutions under its jurisdiction—the General Directorate of Upper Secondary Education (DGB) entrusted the authors of this paper with the development of a key normative tool to facilitate the transition to the MCCEMS within the General Upper Secondary Education subsystem, ensuring the active participation of teaching staff (*Secretaría de Educación Pública*, 2023).

Beyond the required normative adjustments, this process raises both theoretical and practical questions regarding the articulation of academic programs with contemporary educational demands and the specific contextual characteristics of individual schools.

As a result of this work, the Psychopedagogical Guidelines for the Development of Study Programs and Learning Progression were created. This paper aims to present the methodology developed as a contribution to curriculum design from the perspective of learning progressions, with the objective of supporting the effective implementation of the MCCEMS in the General Upper Secondary Education.

Literature Review

Learning Progressions

Learning progressions are an educational model that describes the evolution of students' ideas and thinking processes regarding a concept or topic over time, offering a framework to understand how knowledge and skills gradually develop (Talanquer, 2013). In this sense, they are conceived as learning trajectories that reflect how students advance in their comprehension and abilities as they progress through their education (Heritage, 2008). Since learning is a continuous and dynamic process, it is crucial for educators to recognize these trajectories in order to support student growth more effectively. Consequently, Learning Progressions not only provide a solid foundation for instructional planning, but also serve as a central component of formative assessment, enabling teachers to design targeted strategies that foster more coherent and meaningful learning experiences.

Delving deeper into their theoretical foundation, from a cognitive perspective, Learning Progressions make it possible to map knowledge and practices across different levels of sophistication (Mohan & Plummer, 2012). In this regard, Fortus & Krajcik (2012) describe them as “increasingly sophisticated ways of thinking about how students develop key disciplinary ideas and practices across grade levels” (p. 792). That is, they do not merely define a content sequence but rather represent complex processes of cognitive development. In general terms, Learning Progressions exhibit three fundamental characteristics (Mohan & Plummer, 2012):

- Hypothetical learning models, which describe how students are expected to build knowledge in a specific domain.
- Upper and lower anchors, based on authentic disciplinary practices and students' prior ideas, including misconceptions that can be addressed through instruction.
- Developmental trajectories, which show how students can progress toward more complex ways of thinking with the support of appropriate teaching strategies.

This approach has been officially adopted by the Ministry of Public Education (SEP), which recognizes learning progressions as a central component for achieving the graduate profile in Upper Secondary Education (Educación Media Superior, EMS). In AGREEMENT number 09/08/23, Article 3, it is stated that these progressions enable the sequential organization of learning, facilitating not only the appropriation of cognitive, procedural, and attitudinal knowledge, but also its application to the resolution of personal and social problems. In the words of the agreement itself:

They are innovative and flexible didactic units for the sequential description of the learning outcomes associated with the understanding and resolution of personal and/or social needs and problems, as well as the concepts, categories, subcategories, and the relationships among these elements, which will enable students to gradually understand and develop increasingly complex cognitive, procedural, and attitudinal knowledge for their appropriation and application, thereby contributing to their comprehensive education and well-being, as well as to personal, community, and social transformation. (Secretaría de Educación Pública, 2023)

Following this logic, L. Sáez (2013, as cited in Subsecretaría de Educación Media Superior, 2022) notes that Learning Progressions chart the path along which students advance as they master a concept, process, practice, or skill. Consequently, they become an indispensable tool

for teachers, as they guide the development of essential knowledge within each Curricular Learning Unit (CLU).

In summary, learning progressions constitute a powerful model that promotes a comprehensive understanding of learning by establishing connections between ideas, representing trajectories of cognitive development, and fostering the formation of complex thinking. By enabling students to become aware of their own learning processes and use these connections to solve problems and better understand their environment, Learning Progressions make a decisive contribution to a more robust, inclusive, and transformative education (Fortus & Krajcik, 2012).

Curricular Design of Learning Progressions

Curricular design based on Learning Progressions has been implemented in various countries with the purpose of structuring the gradual development of student knowledge. In nations such as Australia, Canada, China, Hong Kong, Korea, New Zealand, and Singapore, Learning Progressions have served as a key tool for organizing curricula (Hess, 2010). These approaches aim to establish a structured framework that facilitates both teaching and learning through a progressive sequence of knowledge and skills.

From a methodological standpoint, different approaches have been used in the development of Learning Progressions. Heritage (2008) identifies two predominant models: a *top-down* approach, in which experts in curriculum and subject-matter disciplines design the progressions based on research and specialized knowledge; and a *bottom-up* approach, where teachers and education specialists build the progressions from their teaching experience and direct observation of student learning.

A notable example of the *bottom-up* model is the Australian experience, developed in the 1990s through what were known as progress maps. This model originates in the practice of teachers, who identify how learning occurs in specific domains and establish indicators of progress. The resulting framework is subsequently validated based on criteria such as alignment with learning theory and practical utility. Over time, these maps are revised and refined using evidence gathered from student performance, allowing for adjustments in the sequencing of concepts to optimize the learning progression (Masters & Forster, 1996).

In contrast, the model adopted in Canada and the United States follows a *top-down* approach. In these contexts, progressions are designed by central decision-making bodies, with the involvement of subject-matter experts who define essential areas of learning and enduring understandings to be achieved at each educational stage. This model is exemplified in the development of the Common Core State Standards (CCSS), where expected outcomes are first defined for each grade band (K–4, 5–8, and 9–12), and then performance indicators are constructed to guide both instruction and assessment. While this approach promotes curricular coherence and facilitates the organization of learning, it tends to limit opportunities for local adaptation based on teachers' direct classroom experience (Hess, 2010; Lee & Jo, 2022).

In the Mexican context, curricular design has adopted a *bottom-up* perspective, prioritizing the active participation of teachers in the development of Learning Progressions. The General Directorate of Upper Secondary Education implemented a methodology that integrates teachers' disciplinary knowledge with their instructional experience, enabling the

construction of a curricular structure that supports continuity in learning. This methodology ensures that students progressively acquire key competencies necessary for their academic and professional development. In accordance with Article 90 of the General Education Law, teachers play a fundamental role in the educational process and in the adaptation of the curriculum to their specific contexts. Their involvement in curricular design not only strengthens ownership and commitment but also facilitates the effective implementation of educational programs by aligning curricular objectives with the realities of the classroom (Fullan, 1991; Voogt et al., 2019).

The Artistic Paradigm in Curriculum Design

In this regard, the curriculum design methodology adopted by the General Directorate of Upper Secondary Education in Mexico is closely aligned with the artistic paradigm of curriculum design, as described by Visscher-Voerman and Gustafson (2004), who, after a detailed analysis of educational design practices, identified four paradigms that guide curriculum development processes: the instrumental, communicative, pragmatic, and artistic paradigms. The methodological approach presented in this paper is grounded in the latter.

The artistic paradigm is primarily based on the individual process of meaning-making, often supported by the experience and expertise of professionals—in this case, teachers. From this perspective, knowledge is not transmitted in a unidirectional manner, but rather constructed through social activities, context, and culture (Voogt et al., 2019). These elements are also considered essential in the present proposal to develop a meaningful and contextualized curricular structure.

Although the artistic paradigm shares core aspects of curriculum design with instrumental paradigms—such considerations of educational aims, the selection and organization of learning experiences, and mechanisms for evaluating effectiveness (Eisner, 1985; Tyler, 1949)—it differs in its conception of the design process. While the instrumental paradigm favors a linear and planned approach, the artistic paradigm views design as an open and flexible process in which means and ends are interdependent (Marsh & Willis, 2003; Visscher-Voerman & Gustafson, 2004). In this sense, the methodology employed by the General Directorate of Upper Secondary Education allows for dynamic adaptation to the needs of classrooms and students, incorporating the experience and professional judgment of teachers in the development of learning progressions that foster both continuity and relevance in learning. This approach also aligns with the principles of the artistic paradigm, acknowledging that teachers require a foundational understanding of the design and development process in order to ensure effective and context-sensitive implementation (McKenney et al., 2015).

Methodology

This research was conducted using a descriptive approach and a non-experimental design, based on the analysis of the curriculum model proposed by the Subsecretariat of Upper Secondary Education (SEMS). The aim was to design a methodology for the development of Learning Progressions within the framework of the MCCEMS, ensuring its relevance across diverse educational contexts.

The study adopted a descriptive approach, as it sought to characterize and systematize the process of constructing Learning Progressions in the MCCEMS. A non-experimental design

was employed, as no variables were manipulated; instead, the existing curricular framework was analyzed and a methodology was proposed, grounded in theoretical principles and curricular practices.

The development of the methodology was structured in eight phases, taking the artistic paradigm of curriculum design as a reference. For its validation and refinement, an expert peer review was carried out, involving specialists in education and in the MCCEMS. Additionally, a pilot program was implemented with a group of teachers, who provided feedback on the process, allowing for the incorporation of improvements based on their professional experience.

Subsequently, the refined methodology was implemented in 49 Curricular Learning Units (UAC) of the General Upper Secondary Education program, reaching over 27,000 students in institutions coordinated by the DGB.

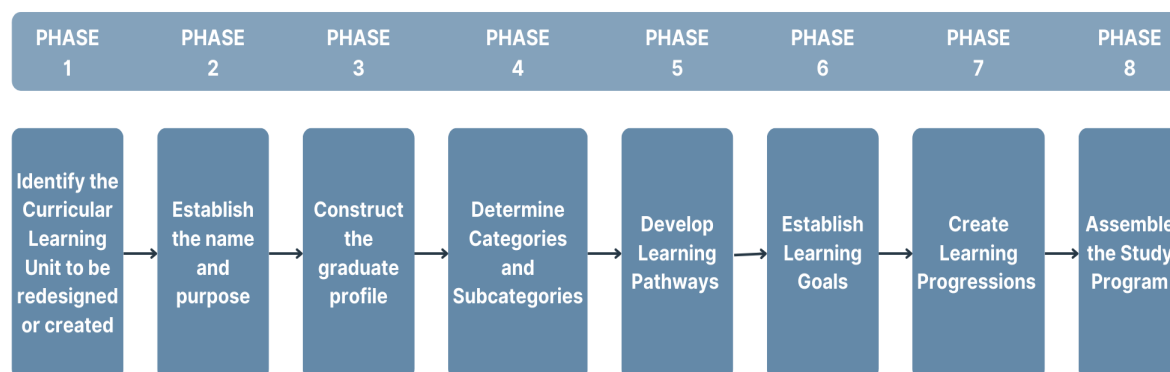
The data analysis focused on reviewing the MCCEMS curriculum model and systematizing the process of developing Learning Progressions. Document analysis techniques were used to examine the principles of the MCCEMS and to design the proposed methodology.

Results

The elements previously discussed informed the design of a methodology for the development of learning progressions based on the artistic paradigm of curriculum design. This methodology includes heuristics that guide the design process. The approach adopted follows a bottom-up model, aiming to leverage the expertise of teachers and subject-matter specialists in constructing learning progressions grounded in their teaching experience and direct observation of student learning.

Through this approach, a pathway was developed for designing the Learning Progressions of the Curricular Learning Units (UACs) within the Extended Fundamental and Compulsory Extended Fundamental Components of the General Baccalaureate. This methodology is published in the “Psychopedagogical Guidelines for the Development of Programs and Learning Progressions”. It consists of eight phases which, due to the structural characteristics of the MCCEMS, may be omitted or reordered as needed.

The phases are outlined as follows:

Figure 1*Suggested Pathway for the Development of Learning Progressions*

Note. Image created by the authors.

Phase 1. Identify the Curricular Learning Unit (UAC) to Be Redesigned or Created

This phase involves determining whether to redesign an existing UAC or create a new one, based on the curriculum's needs and current educational and labor demands. Creating a new UAC allows for the incorporation of emerging disciplines, technological advancements, or labor market shifts, enabling the development of innovative proposals to address current challenges.

Conversely, redesigning an existing UAC enables more efficient use of resources by updating content, methods, or objectives to better align with present-day demands, while preserving curricular coherence and drawing on prior experience.

In both cases, it is essential to analyze the relevance of the content, available resources, and teaching capacity to ensure effective implementation. Additionally, the selected UAC must be aligned with one of the Knowledge Areas, Sociocognitive Resources, or Socioemotional learning domains of the MCCEMS, in accordance with its corresponding epistemological model.

Phase 2. Establishing the Name and Purpose

In this phase, the foundation that will guide the development of the Curricular Learning Unit (UAC) is established by addressing key questions about what, how, and for what purpose the UAC will be taught. This analysis is conducted from the student's perspective, considering university entrance profiles and the current state of the discipline. A review of the UAC's state of the art is required, which involves a documentary analysis of curricula and similar programs from other institutions to ensure the relevance and up-to-date nature of the content. Moreover, it is essential to assess the needs and expectations of students to design a proposal that is aligned with current challenges.

Phase 3. Construct the Exit Profile

This phase must be rigorously aligned with the purpose of the UAC and contribute integrally to its achievement. The construction is carried out through a detailed analysis of the forecast, objectives, purposes, methodology, and core content of the UAC. This analysis includes the following key points:

- Identification of the specific content to be taught.
- Establishment of educational objectives related to that content.
- Identification of the relevant disciplinary fields for the UAC's specific objectives.
- Definition of the essential knowledge needed to deeply understand the content.
- Definition of activities, tasks, and actions required in the disciplinary fields associated with the UAC.
- Identification of the values and aptitudes that will help students achieve their exit profile.
- This approach ensures a structured and comprehensive process, while ensuring coherence with the objectives of the UAC. It is essential that each element contributes synergistically to the established educational goals.

Phase 4. Determine Categories and Subcategories

In this stage, the essential elements that students need to acquire, such as knowledge, skills, activities, attitudes, and values, are identified. Based on this identification, decisions are made on whether to use, adapt, or create new Categories and Subcategories within the Knowledge Areas, Sociocognitive Resources, or Socioemotional Domains relevant to the UAC. The process involves:

- Defining the core content: Establishing the knowledge, skills, activities, attitudes, and values that students should develop.
- Relating content to existing categories: Linking this content with available Categories and Subcategories within the Knowledge Areas and associated Resources.
- Creating new categories and subcategories: If existing categories are insufficient to cover the fundamental content, new ones are designed to properly organize these elements.

This approach ensures precise alignment between the core content and the conceptual structure of the UAC. It also ensures a coherent integration of knowledge, skills, and values, making the educational experience comprehensive and organized.

Phase 5. Develop the Learning Trajectories

This phase focuses on the meaningful organization of the fundamental content that served as an input for determining the categories and subcategories. To draft the learning trajectories, the following process is carried out:

- Identification of elements that share a common category in the exit profile, considering the specific characteristics of the desired graduate.
- Organization of the elements into groups based on the identified categories.
- Evaluation of the coherence and relevance of the formed groups.
- Drafting of the learning trajectories based on the grouped elements by category.

The phase centers on the systematization and coherent structuring of the key elements identified in the previous phase, to formulate learning trajectories that reflect the characteristics of the desired graduate.

Phase 6. Develop Learning Goals

In this phase, the learning trajectories are broken down into sequential and essential steps, allowing for the continuous and connected construction of teaching and learning strategies. This process follows the steps outlined below:

- Identification and description of the sequential and essential stages that precede and lead to the achievement of the learning trajectories.
- Establishment of specific goals and achievements that students should progressively reach each semester.
- Definition of evaluable indicators that facilitate the observation and feedback of student progress during the prior stages and throughout the trajectory.
- Breakdown of each goal, including specific actions that students should undertake during the trajectory.

This detailed and structured approach ensures a clear understanding of the stages and goals throughout the trajectory, facilitating the planning of coherent pedagogical strategies and the effective evaluation of student progress.

Phase 7. Create the Learning Progressions

In this phase, intermediate steps are structured to guide students from simpler to more complex learnings, leveraging the specific characteristics of each Knowledge Area or Sociocognitive Resource linked to the UAC. The process is as follows:

- Identification and description of the progressive learning steps students must develop to achieve the established learning goals.
- Specification of the essential content that must be covered during the semester as the foundation for achieving the learning goals.
- Development of strategies that encourage active student participation.
- Ensuring that the Learning Progressions are broad enough to allow for adaptation and contextualization in different educational settings.
- Validation that the Learning Progressions are interconnected, with progress in one stage preparing students for the next.
- Verification of the use of all categories and subcategories developed.
- Confirmation of the linkage between categories and subcategories with the developed Learning Progressions.

This phase focuses on the detailed development of the Learning Progressions, ensuring that they build on the specific characteristics of each Knowledge Area or Sociocognitive Resource.

Phase 8. Assemble the Study Program

At the conclusion of the academic work, the elements developed in each phase are organized to create the final version. This process is essential to ensure the quality and effectiveness of the work developed throughout the various phases of the creation of the Learning Progressions.

Discussion

This study has allowed the development of a methodology to construct learning progressions aligned with the Common Curricular Framework for Higher Secondary Education (MCCEMS). The proposed methodology, structured in eight phases, offers an innovative perspective adapted to the needs of the Mexican context, drawing upon the artistic paradigm of curricular design. The results show that this methodology has been successfully applied in 49 Curricular Learning Units (CLU) within the General High School curriculum, benefiting over 27,000 students in institutions under the coordination of the General Directorate of Baccalaureate (DGB). These findings suggest that the methodology is promising for improving curricular design and the implementation of learning progressions, as it adapts to the needs of the educational environment and allows for more precise monitoring of students' academic development.

Furthermore, this initiative represents one of the first systematic efforts to develop learning progressions specifically for the General High School level in Mexico. By positioning teachers as the main curricular designers, the methodology adopts a *bottom-up* approach that ensures the curriculum is more meaningful and better adapted to the realities of the students. It also amplifies the voices of teachers—key actors in achieving student learning outcomes—by valuing their professional expertise and direct experience in the classroom. This perspective contrasts with more traditional *top-down* models, in which central authorities design curricula with limited input from practitioners.

Conclusion and Recommendations

This methodology is the result of a rigorous and systematic effort to structure and optimize the process of curricular design based on learning progressions, establishing itself as one of the first experiences to systematize the design of learning progressions in General High School education in Mexico. Its development has enabled the establishment of a methodological framework that facilitates the construction of Curricular Learning Units (UACs) aligned with the MCCEMS, through an innovative *bottom-up* approach. By positioning teachers as the main curricular designers, the methodology ensures that the curriculum becomes more meaningful and better adapted to students' realities, while listening to the voices of those who are fundamental actors in achieving student learning.

To date, the methodology has been applied in the design of 49 UACs within the General High School curriculum, positioning approximately 230 teachers not only as specialists in their respective disciplines but also as active agents in curricular construction. This approach has strengthened the quality and coherence of educational programs in institutions coordinated by the DGB and has directly impacted over 27,000 students from the Centros de Estudios de Bachillerato.

Furthermore, its potential reach extends to around 700,000 students, as State Colleges of High School can access both the UACs designed with this methodology and the methodology itself, adapting it to their specific contexts. Likewise, Private Incorporated High Schools have the published document as a reference tool to develop their own curricula, further expanding the impact of this proposal across Upper Secondary Education.

However, it is important to recognize that the methodology has not yet been evaluated longitudinally. Further research is needed to assess its long-term impact on student learning,

school retention, and overall academic performance. Future studies will be crucial to confirm the effectiveness and sustainability of this approach throughout the full three-year educational cycle of General High School.

In terms of impact, this methodology establishes itself as a strategic national resource, offering a theoretical and practical framework that guides curricular design towards more flexible, adaptive, and student-centered models. Its implementation responds to the needs of the current educational context and lays a solid foundation for future innovations in the planning, design, and evaluation of high school education in Mexico.

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References

- Eisner, E. W. (1985). *The educational imagination: On the design and evaluation of school programs* (2nd ed.). Macmillan.
- Fortus, D., & Krajcik, J. (2012). Curriculum coherence and learning progressions. In Fraser, B., Tobin, K., McRobbie, C. (Eds.), *Second International Handbook of Science Education*, (pp. 783-798). Springer, Dordrecht. https://doi.org/10.1007/978-1-4020-9041-7_52.
- Fullan, M. (1991). *The new meaning of educational change* (2nd ed.). Cassell Educational Limited.
- Heritage, M. (2008). *Learning progressions: Supporting instruction and formative assessment*. National Center for Research on Evaluation, Standards, and Student Testing (CRESST). https://www.oregon.gov/ode/educator-resources/assessment/Documents/LLP_Module_1_Reading_Learning_Progression.pdf
- Hess, K. (Ed.). (2010). *Learning progressions frameworks designed for use with the Common Core State Standards in Mathematics K-12*. National Alternate Assessment Center at the University of Kentucky & National Center for the Improvement of Educational Assessment.
- Lee, J., & Jo, I. (2022). Assessment of mapping learning progressions in geography. In T. Bourke, R. Mills, & R. Lane (Eds.), *Assessment in geographical education: An international perspective* (pp. 55–77). Springer. https://doi.org/10.1007/978-3-030-95139-9_3
- Marsh, C. J., & Willis, G. (2003). Approaches to curriculum. In *Curriculum: alternative approaches, ongoing issues* (3rd ed., pp. 66–92). Pearson Education.
- Masters, G., & Forster, M. (1996). Progress Maps. ACER.
- McKenney, S. E., Kali, Y., Markusauskaite, L., & Voogt, J. (2015). Teacher design knowledge for technology-enhanced learning: An ecological framework for investigating assets and needs. *Instructional Science*, 43(2), 181–202. <https://doi.org/10.1007/s11251-014-9337-2>
- Mohan, L., & Plummer, J. (2012). Exploring challenges to defining learning progressions. In Alonzo, A. C. & Gotwals, A. W. (Eds.), *Learning progressions in science*. SensePublishers, Rotterdam. https://doi.org/10.1007/978-94-6091-824-7_7
- Secretaría de Educación Pública. (2023, August 25). *Acuerdo 09/08/23 por el que se establece y regula el Marco Curricular Común de la Educación Media Superior* [Agreement 09/08/23 establishing and regulating the Common Curricular Framework for Upper Secondary Education/]. Diario Oficial de la Federación. https://sep.gob.mx/work/models/sep1/Resource/24955/1/images/a09_08_23.pdf

- Subsecretaría de Educación Media Superior. (2019). *Rediseño del Marco Curricular Común de la Educación Media Superior* [Redesign of the Common Curricular Framework for Upper Secondary Education]. Secretaría de Educación Pública.
- Subsecretaría de Educación Media Superior. (2022). *Fundamentos del Marco Curricular Común de la Educación Media Superior, 2022* [Foundations of the Common Curricular Framework for Upper Secondary Education, 2022]. Secretaría de Educación Pública.
- Subsecretaría de Educación Media Superior. (2024, August 14). *Propuesta del Marco Curricular Común de la Educación Media Superior* [Proposal of the Common Curricular Framework for Upper Secondary Education]. Educación Media Superior. <https://educacionmediasuperior.sep.gob.mx/propuestaMCCEMS>
- Talanquer, V. (2013). Progresiones de aprendizaje: Promesa y potencial [Learning Progressions: Promise and Potential]. *Educación Química*, 24(4), 362-364. http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0187-893X2013000400001&lng=es&tlng=es
- Tyler, R. (1949). *Principles of Curriculum and Instruction*. University of Chicago Press.
- Visser-Voerman, J. I. A., & Gustafson, K. (2004). Paradigms in the theory and practice of education and training design. *Educational Technology Research & Development*, 52(2), 69–89.
- Voogt, J., Pieters, J., & Pareja, N. (2019). Collaborative curriculum design in teacher teams: Foundations. In J. Pieters, J. Voogt, & N. Pareja Roblin (Eds.), *Collaborative curriculum design for sustainable innovation and teacher learning* (pp. 5–18). Springer. https://doi.org/10.1007/978-3-030-20062-6_1

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