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Fostering Critical Thinking across the Primary School's Curriculum in the European Schools System

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Abstract: To develop citizens' critical thinking (CT) abilities, schools must better integrate CT into the curricula. Although educators, psychologists, and philosophers agree on the importance of critical thinking, there is no agreement on a common theoretical definition. The goal of this study is to define the framework for the promotion of critical thinking in the context of curriculum development. Specifically, to explore how the primary school curriculum addresses the concept of CT, and to identify characteristics, core skills, and approaches to CT in the syllabi. We conducted a document analysis of curriculum and syllabi in the European Schools system. The results show that although the primary school curriculum does not define the concept of CT, it does consider it a key skill to develop and foster among pupils across the school syllabi. Concerning the CT teaching approaches, our study detected a holistic approach in which the European Schools system supports CT as an explicit and implicit goal within a standard subject-matter content instruction. This study can be used in future educational research with different stakeholders (teachers, school principals, policymakers, researchers) involved in curriculum development.



Citation: Lombardi, L.; Mednick, F.J.; De Backer, F.; Lombaerts, K. Fostering Critical Thinking across the Primary School's Curriculum in the European Schools System. *Educ. Sci.* **2021**, *11*, 505. <https://doi.org/10.3390/educsci11090505>

Academic Editor: Greg Kessler

Received: 15 July 2021

Accepted: 1 September 2021

Published: 5 September 2021

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Keywords: critical thinking; primary education; school curriculum; European Schools

1. Introduction

Education should equip students with the skills they need to become active, responsible, and engaged citizens. After all, students who are well-prepared for the future can become change agents [1]. Such students can have a positive impact on their surroundings, influence the future, understand others' intentions, actions, and feelings, and anticipate the short- and long-term consequences of their actions [1]. Students are confronted with unknown and evolving circumstances later in life so they need a wide range of skills, including cognitive and metacognitive skills (e.g., critical thinking, creative thinking, learning to learn, self-regulation); social and emotional skills (e.g., empathy, self-efficacy, collaboration); and practical and physical skills (e.g., information and communication technology). These skills should be strongly integrated into school curricula [1]. Being literate in the media age requires critical thinking skills that empower students to make informed decisions in the classroom, the living room, the workplace, and the voting booth [2]. The Paris Declaration of the European Union [3] highlights the importance of "strengthening children's and young people's ability to think critically and exercise judgement so that they are able to grasp realities, to distinguish fact from opinion, to recognize propaganda and to resist all forms of indoctrination and hate speech."

According to the Council of Europe [4], critical thinking consists of those skills that are required to evaluate and make judgments about materials of any kind. If students acquire the skill of critical thinking, they will be able to scrutinize new information and ideas and alternative perspectives and modes of life and to judge if they are acceptable or desirable [5]. A key 21st century challenge is that critical thinking is needed more than ever in a world that must tackle immediately accessible information, modern jobs, and fake news [6]. Although it is widely accepted that improving students' critical thinking

is an important educational goal, primary school pupils lack critical thinking skills [7]. In formal education, especially in primary schools, pupils appear to have inadequate guidance to evaluate, process, and critically reflect on information [8]. This can be due to the teachers' continuing lack of knowledge, education, and training to stimulate critical thinking [9]). School curricula often place too much emphasis on what to think instead of how to think [10] (p. 478). This change requires a major shift in thinking about instructional paradigms and public investments and policy reforms across school curricula [10]. For example, instead of continuing to focus on individual subjects [11], policymakers need to look across disciplines at how to develop students' skills in critical thinking.

Relevant authors [12] surveyed the research literature and concluded that young children can benefit from critical thinking instruction, as well as when they grow older, because critical thinking ability improves with age. Other relevant studies [12–14] concluded that young children benefit from being taught critical thinking because it enhances the ability for questioning, making suggestions of a hypothetical nature, and engaging in reasoned thinking through peer group conversation. Thus, empirical evidence supports the notion that young children can think critically [15,16]. In the 21st century, many educational systems are responding to the challenge and responsibility of fostering pupils' acquisition of critical thinking skills across the schools' curricula [17]. School systems, especially in primary education, can play a significant role in equipping pupils with the tools they need to become engaged critical thinkers and active members of their communities [17].

Despite studies worldwide that emphasize the need for critical thinking in childhood, research on primary school education remains scarce. The focus of this research is to explore how primary school curricula among European Union member states address critical thinking.

1.1. Concept of Critical Thinking

Critical thinking is not a new concept in education. The first teacher to teach the practice of thinking was Socrates (469–399 BCE) who provoked doubt in his students to stimulate their search for truth. Socrates' questioning approach to critical thinking was later emulated by Plato, Aristotle, and the Greek sceptics who emphasized that things are often different from what they appear to be. The need to understand the deeper realities through thinking systematically, tracing implications, and going beyond the surface of each piece of information emerged from this ancient Greek tradition [18,19]. Its modern origins date back to the leading educational theorist John Dewey [20], who in the early 20th century pointed to the importance of so-called reflective thinking as a key competence for students. Later, it was renamed critical thinking. Dewey [20] described the concept of critical thinking as an active, persistent, and careful consideration of a belief based on a solid foundation of evidence. The idea of critical thinking as one of the four components of the ability to think, alongside creative thinking, decision-making and problem-solving, was widely accepted in the scientific literature of the 21st century [21]. In fact, critical thinking is considered one of the most important 21st century skills in education, along with creativity, communication, and collaboration; the so-called 4 C's [2,21].

Several authors [19,22–30] continued to formulate a definition of critical thinking by highlighting the skill and its disposition-based aspects without reaching any scientific agreement. Thus, to date, there is no consensus on a common theoretical definition of critical thinking among experts, scientists, educators, psychologists, and philosophers.

The present study used UNESCO's [2] definition of critical thinking and defines it as a process that involves asking appropriate questions, gathering, and creatively sorting through relevant information, relating new information to existing knowledge, re-examining beliefs and assumptions, reasoning logically, and drawing reliable and trustworthy conclusions. An important argument to use the UNESCO [2] definition is the emphasis on the ongoing effort needed to master critical thinking skills. In doing so, it is important to apply theoretical constructs to understand a problem, to consider evidence, and to evaluate methods or techniques for building a judgement.

1.2. Characteristics of Instruction and Core Skills of Critical Thinking in the School Curriculum

Current research [31–33] investigates which characteristics of instruction can enhance critical thinking in the school curriculum. Sheni [34] stresses the importance of student-centered classrooms promoting active learning where the role of the teacher shifts from the traditional provider of information to the role of a guide, facilitator, or learning adviser. Additionally, critical thinking can be fostered through questioning [35,36]. This is relevant for learners because questioning stimulates a learning interaction among pupils and fosters cooperative learning. Furthermore, without questioning and collaboration, there would be no problematizing and deeper understanding, only memorizing, recalling, and copying [36]. The limited research on primary education [37] demonstrates that critical thinking can only be developed in a school curriculum that highlights the exchange in different points of views and freedom of speech among pupils and teachers. As Molnar, Boninger and Fogarty [38] (p. 4) state:

“Critical thinking is best cultivated in a school curriculum that encourages pupils to ask questions, to think about their thought processes, and thus to develop habits of mind that enable them to transfer the critical thinking skills they learn in school to other, unrelated, situations.”

Several studies [36,39–43] investigated the importance of the core skills of critical thinking [44] across the curriculum. First, to foster the critical thinking skill of interpretation, Trede and McEwen [36] report the importance of pupils’ learning through questioning for a deeper understanding of the facts. Second, the findings of Llano [41] suggest that debate is a useful social interaction practice to promote the critical thinking skill of analysis. Third, Friesen and Scott [40] found that to foster the critical thinking skill of inference, pupils should be encouraged to work collaboratively to solve problems. Fourth, to stimulate evaluation, Smith and Higgins [43] suggested encouraging peer to peer feedback and sharing of pupils’ ideas to make decisions. Fifth, to foster the skill of explanation, Burnett et al. [39] highlighted how a rethinking process using digital tools provided new purposes for children’s communication and offered new opportunities for cooperation in the development of critical thinking skills and understanding. Finally, to foster the skill of self-regulation, Salmon [42] discussed the power of daily routines and repetition of each concept in a school lesson. Furthermore, Facione [44] proposed the IDEAS strategy to promote the core skills of critical thinking across the school curriculum in all subjects. IDEAS is an acronym for the five steps designed to foster the six specific skills to stimulate critical thinking: identify the problem, set priorities (I) (1: interpretation); deepen understanding and gather relevant information (D) (2: analysis); enumerate options and anticipate consequences (E) (3: inference); assess situation and make a preliminary decision (A) (4: evaluation); and scrutinize the process and self-correct as needed (S) (5: explanation; 6: self-regulation).

Research shows that primary education plays an important role in the development of critical thinking [14,16,44]. However, what is not clear from the literature is how the characteristics of instruction and the core skills of critical thinking are embedded in the primary school curricula.

1.3. Critical Thinking Approaches in the School Curriculum

Ennis [45] was one of the first in the field to differentiate between instructional approaches that teach critical thinking skills as a stand-alone course and critical thinking skills that are integrated into regular instruction. Later, several researchers [16,46,47] referred to Ennis’ [45] analysis to introduce critical thinking in the schools’ curricula using his four instructional approaches as follows (Table 1): (i) teaching critical thinking as a separate subject (the general approach); (ii) teaching critical thinking as an explicit goal within subject-matter teaching (the infusion approach); (iii) teaching critical thinking as an implicit goal within subject-matter teaching (the immersion approach); (iv) teaching critical thinking as a separate goal parallel to subject-matter teaching (the mixed approach).

Table 1. Source: Critical Thinking Approaches [45] (p. 5). Adapted from Ennis (1989).

The General, Infusion, Immersion and Mixed Approaches to Teach Critical Thinking			
Approach	CT Explicit Instruction	Standard Subject-Matter Content (Only)	Standard Subject-Matter Content and Other Content
General	Yes	No	Yes
Infusion	Yes	Yes	No
Immersion	No	Yes	No
Mixed	Yes	No	Yes

The general approach to critical thinking in school curriculums is to directly teach cognitive skills and other skills considered significant for critical thinking in isolation from subject-specific content (explicit instruction) [45]. Similarly, Halpern [48] argues that instruction in general thinking skills taught as a cross-disciplinary course is the most effective way of teaching critical thinking. Van Gelder [49] appears to advocate for the general approach to critical thinking instruction. Drawing from the literature, students need deliberate practice in exercising critical thinking skills [49]. However, teachers need to teach students how to transfer critical thinking to several contexts by providing them with opportunities to apply critical thinking skills in diverse contexts [16]. This general approach entails direct and explicit instruction in critical thinking skills as a separate course where critical thinking skills are emphasized outside the context of a specific subject-matter (e.g., in separate instructional units in the elementary school) [16] (p. 5). Typically, the content is not related to discipline-specific knowledge but tends to be drawn from problems that students are likely to encounter in their daily lives [47].

The infusion approach to critical thinking is tied to specific learning content within subject-matter instruction (e.g., embedded instruction), as an explicit goal (explicit instruction). Thus, Ennis [45] indicates that this approach is commonly seen in across the curriculum movements in which students are encouraged to think critically in the subject. Later, other studies extended his work. Furthermore, Meng [50] describes student responses as follows: (i) the impact on students is bigger when the teaching is more explicit; (ii) students are more open to valuing critical thinking when the curriculum incorporates an atmosphere of thoughtfulness; (iii) students learn the content better when the teaching of critical thinking is integrated into content instruction.

In the immersion approach, the development of critical thinking is an implicit goal of the curriculum. Thus, critical thinking skills are not the focus of direct and explicit instruction. Rather, students are expected to acquire these skills as a natural consequence of engaging within the subject-matter instruction [45]. In this approach, students are engaged in dialogue and encouraged to think about, analyze, and evaluate diverse perspectives immersed in the subject. However, Ennis [51] added that without a clear understanding of critical thinking skills, students will experience difficulties transferring those skills to other domains.

The mixed approach combines elements of the general approach with either infusion or immersion approaches [45] (p. 5). The explicit instruction of critical thinking (an element of the general and infusion approaches) is treated as an independent track (an element of the general approach) within a subject-specific course (element of infusion and immersion approaches) [45,52,53]. Teachers match stand-alone instruction in general critical thinking principles with an application of critical thinking skills in the context of specific subject-matter.

Although some studies show that providing explicit instruction on critical thinking skills allows pupils to perform most effectively as critical thinkers [50], especially when a mixed approach is employed, there is a numerical minority of studies that investigated the effects of such an approach. As a result, several authors [12,54] concluded a lack of sufficient evidence to support the superiority of a single approach.

1.4. Context of the European Schools System

The present study was conducted in the European Schools system. This system was selected because the Schola Europaea's guidelines for primary school [55] clearly include the development of critical thinking skills as one of the four main priorities for the pupils' learning process. The European Schools are educational institutions that were formed in the 1950s to teach the children of European Union institutions' staff in their mother tongue [56]. They now also offer places to other children in return for a fee [57]. According to the Schola Europaea's guidelines [55], these schools are official educational institutions controlled by the governments of the European Union member states. Each country is responsible for the recruitment of teachers who are trained and selected according to the national system. There are currently thirteen European Schools spread over six countries; Belgium (five schools), Germany (three schools), Italy (one school), Luxembourg (two schools), the Netherlands (one school) and Spain (one school). Each European school consists of three educational cycles (kindergarten, primary, and secondary education) in which primary education offers five classes for children 6–10 years of age.

According to Swan [58], European Schools differ from international schools because each school has different language sections, instead of just one, depending on the cultural dimension and the number of pupils enrolled. In all language sections, education is based on a common European curriculum. However, the syllabus of each subject is designed to include educational content for each member state so that pupils can easily enroll in their national education system on their return home. In general, teachers are seconded from their home country for a certain period, after which they return to their member state of origin. Teachers are expected to adapt to the European structure, follow European curricula, and apply the didactic and pedagogical principles that underpin the European Schools. Teachers receive in-service training on-site to gain more experience in both learning theories and pedagogical approaches [55].

The primary education curriculum is formed of general objectives and its syllabi (all subjects) are designed and written by European Schools' inspectors and teachers. The curriculum is then approved by the Board of Governors (composed of the Ministers of Education of each European Union country), based on a favorable opinion from the relevant Teaching Committee, composed of representatives of teachers across the European Schools [55]. A table of equivalence lists the school requirements of the different member states and determines the appropriate class year a child should attend when they move from the European Schools back to their country of origin or vice versa. In primary education, the syllabi [59] cover ten subject areas as follows:

1. Language I/mother tongue
2. Language II
3. Mathematics
4. Discovery of the world
5. Art
6. Music
7. Physical education
8. Religion (protestant, catholic, orthodox religious education) or ethics
9. European hours
10. Information and communication technology (ICT)

The structure of a syllabus in the system of the European Schools is the same for all the subjects [59]. It contains general objectives, didactic principles, learning objectives, content, and assessment.

Only a few studies address critical thinking in the primary school curriculum [14, 16,50,60]. Most of the relevant studies on critical thinking are situated in the context of secondary education. Furthermore, the current literature lacks in-depth information on how primary education approaches critical thinking in the primary school curricula.

2. Materials and Methods

2.1. Purpose and Research Questions

The current study aimed at exploring the primary school curriculum in EU countries concerning the concept of critical thinking, the characteristic of instruction, and core skills and approaches. First, we explored, in-depth, the school curriculum concerning the characteristics of instruction to promote the concept of critical thinking in primary education. Second, we investigated how primary school syllabi support core critical thinking skills. Third, we identified the instructional approaches that foster critical thinking in the primary school curriculum. Specifically, we addressed the following research questions:

1. Which characteristics of instruction refer to the concept of critical thinking in the primary school curriculum?
2. Which core skills of critical thinking do the syllabi represent?
3. Which critical thinking approaches does the school curriculum report?

2.2. Data Collection

In this study, we used a qualitative research methodology. As a research method, document analysis is particularly applicable to qualitative intensive studies producing rich descriptions of a single organization or program [61]. The core of this research consisted of a document analysis [62] of the European Schools' primary school curriculum. We began by gathering the available online documents on the primary school curriculum of the European Schools from the official website of the Office of the Secretary-General of European Schools (located in Brussels, Belgium). Specifically, we selected all nineteen documents published on the official website of the Office of the Secretary-General of European Schools (Table 2) for our analysis.

Table 2. Document selection.

No.	Primary Source Document	Publication Year
1	Art education syllabus	2013
2	Attainment descriptors for L2 at the end of P5	2018
3	Catholic religious education	2011
4	Convention defining the statute of the European Schools	1994
5	Discover the world syllabus	2015
6	Ethics syllabus	2016
7	European Hours	2016
8	Guidelines for primary education	2006
9	ICT syllabus	2000
10	Key competencies for lifelong learning in European schools	2018
11	Language 1 syllabus	2016
12	Language 2 syllabus	2012
13	Mathematics syllabus	2012
14	Music syllabus	2016
15	Orthodox religious education	2011
16	Physical education syllabus	2015
17	Primary education curriculum	2006
18	Protestant religious education	2012
19	Structure for all syllabi in the system of European Schools	2019

2.3. Instrument

A review of the literature on critical thinking provided an understanding of its theoretical background and helped to focus on the research questions. Specifically, for RQ 1, to determine which characteristics of instruction can enhance critical thinking in the primary school curriculum of the European Schools, we referred to its theoretical framework [31–38]. To determine the extent to which the primary school curriculum includes critical thinking (RQ 2), we used Facione's [44] skills scheme (Table 3).

Table 3. Source: Core Critical Thinking Skills [44] (pp. 9–10). Reprinted from Facione (2015).

Core Critical Thinking Skills		
Skill	Experts' Consensus Description	Subskill
Interpretation	"To comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria"	Categorize Decode significance Clarify meaning
Analysis	"To identify the intended and actual inferential relationship among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgement, experiences, reasons, information, or opinions"	Examine ideas Identify arguments Identify reason and claims
Inference	"To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to reduce the consequences flowing from data, statements, principles, evidence, judgements, beliefs, opinions, concepts, descriptions, questions, or other forms of representation"	Query evidence Conjecture alternatives Draw logically valid or justified conclusions
Evaluation	"To assess the credibility of statements or other representations that are accounts or descriptions of a person's perception, experience, situation, judgement, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationship among statements, descriptions, questions, or other forms of representation"	Assess credibility of claims Assess quality of arguments that were made using inductive or deductive reasoning
Explanation	"To state and to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one's results were based; and to present one's reasoning in the form of cogent arguments"	State results Justify procedures Present arguments
Self-regulation	"Self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results educed, particularly by applying skills in analysis, and evaluation to one's own inferential judgements with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results"	Self-monitor Self-correct

There is a consensus from a panel of 46 international experts on critical thinking about the value of the skills scheme of Facione [44] that describes the core critical thinking skills to include across a school curriculum. Other possible approaches such as investigating critical thinking dispositions, were not explored since our study mainly focused on the needed skills in the 21st century and how education should equip students with these skills. The core critical thinking skills were based on a literature-led approach.

To address the RQ 3, regarding the critical thinking approaches reported in the school curriculum, we referred to Ennis's [45] approach scheme (see Table 1).

A scheme (analysis framework) of the concepts, a description of each concept, and a code were designed to analyze the content. The initial coding structure was also based on the literature [7,9,10,44].

2.4. Data Analysis

The nineteen documents of the primary school curriculum were examined using content analysis methodology to systematically describe these qualitative materials. We also conducted a qualitative interpretive text analysis. Specifically, each text was divided and assigned to categories based on a shared meaning (coding phase) and analyzed (analysis phase) by tracing and describing the tendencies and regularities in the text [63]. The coding scheme contained the essential parts of the research questions aimed at investigating the factors of critical thinking concepts, characteristics of instruction, core skills, and design approach. Recurring themes, common patterns, and key factors were identified and described to ensure the replicability and reliability of the content analysis method [62].

3. Results

3.1. Critical Thinking across the Primary School Curriculum of the European Schools' System

The primary education curriculum of the European Schools [64] mentions critical thinking as a key skill to develop among pupils together with other higher-order skills (e.g., problem-solving, collaboration, communication). However, there is a lack of clarity concerning what exactly is included across the curriculum. The curriculum refers to higher-order skills as one of the key competencies for lifelong learning in the European Schools' framework [65] and is the basis of the European Schools' syllabi [59].

The primary education curriculum [64] mentions that one of the key factors in learning is the development of critical thinking among pupils. This text includes teaching strategies such as cooperative learning, sharing of different ideas, and small group discussions to foster critical thinking. Specifically, the primary education curriculum document states that all pupils should have opportunities to work together, as a whole class in a group or in teams, and they should also be allowed to work independently on occasion. Whole-class teaching should be as interactive as possible and allow pupils to answer questions and to take part in discussions and express their views or ideas [64] (p. 8). The primary education curriculum document also states that the teaching of all subjects is based on didactic principles that can foster critical thinking. Thus, the document reports that an integrated teaching and learning approach creates links and associations among the different areas of the European Schools curriculum, which makes the process of learning and developing critical thinking a more comprehensive and meaningful experience among pupils.

The primary education curriculum document also stresses the importance of an active learning strategy to guide pupils into becoming responsible for their learning process. These principles are applied through a variety of teaching and learning approaches and strategies such as the use of differentiated teaching methods and the use of a wide range of learning resources including digital tools.

It is fundamental to analyze each syllabus of the primary school curriculum (Table 4) to explore the link with the core skills of critical thinking [44].

Concerning the heart of the assessment process, the primary education curriculum states that pupils "have an important role to play in their own assessment if they wish to have a clear idea of what they know and what must be learned" [66] (p. 9). The primary education curriculum also states that learning assessments can be formed through asking questions, observation, discussion, analysis, checking of understanding, and pupils' involvement in revision. Additionally, this curriculum highlights that the process of checking pupils' understanding and their continuous involvement in learning process can foster the critical thinking skill of self-regulation. With additional reference to the assessment criteria, all primary education syllabi stress the relevance of engaging pupils in their own learning process to enable them to improve their learning strategies. In all syllabi the pupil's self-regulation is considered a fundamental part of formative assessment to enable them to become aware of their strengths and weaknesses.

Table 4. Analysis of core skills of critical thinking through the syllabi.

Core Skills of CT	Description	Syllabus
Interpretation	To foster the pupils' ability to distinguish between important information in a text and search for information autonomously using diverse written sources.	Art Discovery of the world Ethics education Language 1 and 2 Music Religious education
	To help pupils recognize and decode a problem.	Mathematics
	To understand and gather information about others' team strategies to reach a goal.	Physical education
Analysis	To make connections with pre-existing knowledge.	Art Discovery of the world Ethics education Language 1 and 2 Music Religious education
	To understand and compare information about different cultures. To understand important information. To select the knowledge needed to solve a problem. To select the best strategy for a given problem.	European hours Mathematics
	To express pupils' opinions, formulate hypotheses, and make predictions.	Art Discovery of the world Ethics education Language 1 and 2 Music Religious education
Inference	To question and debate different options.	European hours
	To improve cooperation and interactive exchanges between pupils. To inquire from other pupils, pose key questions, and generate ideas.	ICT Mathematics
	To draw conclusions.	Art Discovery of the world Ethics education Language 1 and 2 Music Religious education
Evaluation	To make informed decisions using the results of discussion and reasoning in a small group of pupils. To make decisions in teams, according to rules.	Mathematics Physical education

Table 4. Cont.

Core Skills of CT	Description	Syllabus
Explanation	To encourage pupils to express the process they used to make their decisions and foster debates.	Art Discovery of the world Ethics education Language 1 and 2 Music Religious education
	To improve pupils' learning strategies. To encourage pupils to reason and think through how to describe, interpret, and explain their thinking.	ICT Mathematics
Self-regulation	To conduct daily assessments and self-assessment through a process that involves teachers' checking pupils' understanding and pupils' consistent involvement in learning revision pathways.	Art Discovery of the world Ethics education European hours ICT Language 1 and 2 Mathematics Music Physical education Religious education

3.1.1. Critical Thinking Skills in Language 1 Syllabus

The language 1 (L1) syllabus [67] implicitly enumerates the relevant learning outcomes for pupils related to core critical thinking skills. Concerning listening and understanding, the text explains the process and results of distinguishing between important and less important information. Concerning speaking, the text explains that it is important to relate to previously acquired knowledge, express personal opinions, justify opinions with details and examples, and draw adequate conclusions. Additionally, the document stresses the value for pupils of presenting topical information logically, playing different roles, and exploring a variety of situations and perspectives. Concerning reading and understanding, the syllabus states the kinds of learning outcomes that can occur when pupils anticipate the continuity of a text, seek information autonomously through diverse written sources, and make connections. The syllabus also points out, for teachers, the importance of explaining the meaning of a text by encouraging students to express their opinions, and using different types of autonomously selected text to meet pupils' specific needs. Concerning writing, the syllabus describes, for pupils' the learning outcomes of writing using a variety of draft techniques (e.g., mind maps).

3.1.2. Critical Thinking Skills in Language 2 Syllabus

The language 2 (L2) syllabus [68] implicitly recognizes critical thinking as a fundamental teaching approach stating that "pupils should be enabled to use foreign languages through project-based learning and inquiry." The L2 syllabus is based on a dynamic model of teaching and learning where the teacher is asked to create a motivating and stimulating learning environment through activity-based and thought-provoking learning strategies including modelling and scaffolding new learning and carefully monitoring each pupil's progress. The document highlights that pupils should be active participants who are aware of their learning processes. The syllabus clearly states that language 2 skills can be an additional tool for developing empathy, preparedness, receptivity, and critical thinking among pupils. The syllabus also suggests that students use differentiated, networked, cross-curricular, and freedom of expression approaches to achieve these strengths.

The skills of critical thinking are implicitly expressed through the specific aims of language 2. The syllabus states that pupils should learn to perform the following learning tasks: (i) ask questions, express and debate ideas; (ii) exchange, check and confirm pertinent

information; (iii) engage with others' ideas; (iv) explain and summarize; (v) identify and extract information; (vi) recognize people's points of view in texts; (vii) find information on a specific topic using a range of sources; (viii) apply different strategies to solve problems; (ix) develop and be able to support personal opinions; (x) reflect.

3.1.3. Critical Thinking Skills in the Mathematics Syllabus

The mathematics syllabus [69] implicitly states the relevance of core critical thinking skills such as understanding, selecting, and analyzing important information to solve a problem, considering various strategies and drawing conclusions. The text highlights the importance of inquiry because pupils need routine practice in posing key questions, generating ideas, and making informed decisions; and the ability to reason to learn how to describe, interpret, explain, and use information in their reasoning. Included in the syllabus is the importance of communication skills so pupils can express their thoughts, connect, and keep track of the direction they are taking. Thus, the document stresses the need to provide opportunities for pupils to present their thinking to others. Finally, the text emphasizes the importance of the reviewing process wherein pupils check their results, discuss their findings, reason with others, and reconsider their chosen strategy.

Concerning teaching methodology, the mathematical syllabus claims that teachers should highlight how pupils use and apply higher-order thinking skills such as critical thinking and provide pupils with opportunities to apply these skills to each subject area in math. The document also explains that both discussion and acceptance of others' points of view are central to the development of the critical thinking process. Further, the text states that as part of the learning process, teachers should develop the skill of explanation to foster pupils' confidence in expressing their ideas and points of view and encourage pupils to identify misconceptions and errors.

3.1.4. Critical Thinking Skills in Discovery of the World Syllabus

The discovery of the world syllabus [70] consists of five different areas of study: historical, socio-cultural, geographical, technological, and biological. Each area of study is further divided into specific topics for each year group. One of the aims of this syllabus is to develop and encourage critical thinking skills. The document highlights the development of skills such as questioning (e.g., asking questions that will identify problems to be solved); making observations and describing events (e.g., using the senses to observe and describe characteristics, and differences and similarities); and formulating hypotheses and making predictions (e.g., predicting what will happen in structured situations when a variable is altered). The syllabus also points to the relevance of investigating and experimenting (e.g., designing, planning, and carrying out simple investigations); sorting and classifying (e.g., sorting and presenting data in sets and sub-sets using a range of appropriate criteria); recording and presenting information using a variety of methods (e.g., oral and written accounts, charts, graphs and diagrams, and information communication technology for presentations); and drawing conclusions (e.g., reviewing the method used in an investigation, assessing its usefulness and suggesting alternative methods when required).

Regarding content that implicitly promotes critical thinking skills, the syllabus points to the relevance of the European dimension which stresses that pupils should be taught to compare information and ideas and discuss the similarities and differences between any two EU member states with regards to culture (e.g., art, music, national sports, national dishes, habitats, etc.).

Concerning the teaching methodology, the syllabus reports that pupils are taught to reflect on and evaluate their progress during the learning process. The document also implicitly refers to teaching strategies such as discovery-based learning, cooperative learning in groups or pairs, pupil-centered learning (e.g., using pupils' experiences as an entry point for the topic at hand) that encourage critical thinking skills.

3.1.5. Critical Thinking Skills in the Art Education Syllabus

The art education syllabus [71] implicitly includes core critical thinking skills that should be developed. These include the ability to connect one's own creative and expressive points of view to the opinions of others. One of the main goals of critical thinking is to promote an understanding of different cultures to create an open attitude towards and respect for diversity in all its forms. The document also emphasizes the importance of forming hypotheses, comparing works that deals with the same themes, forming critical opinions, developing ideas and a point of view, and presenting and justifying these ideas.

Concerning the teaching methodology to implicitly foster critical thinking skills, the syllabus states that teachers should guide pupils to express their impressions, compare ideas, justify personal viewpoints using critical judgment, and provide an explanation for their choices or interpretations. Concerning the syllabus' learning outcomes, when pupils confront each other with their ideas and collaborate on work, evidence of critical thinking skills may be inferred.

3.1.6. Critical Thinking Skills in the Music Syllabus

The music syllabus [72] explicitly states that pupils should develop a critical engagement with music that allows them to listen to and reflect on musical creations. Furthermore, the syllabus stresses that through music, children can develop their understanding, make musical judgments, apply their new learning, express themselves physically and emotionally, and create their own musical ideas. Music's implicit relationship to critical thinking includes the ability to recognize and distinguish between different timbres, identify tempo by comparing two different works, discuss and compare the musical characteristics of musical selections, and express feelings and preferences for a piece of music. According to the document, it is important to create opportunities for children to express their points of view and share them with others. The text in the syllabus points to the importance of reflection on the pupils' learning in the student's portfolio of primary school. Additionally, the syllabus states that to express a critical appreciation of a piece of music requires an appreciation of diversity. According to the music syllabus, "music is very personal and so it can be analyzed differently by different children. It can be soothing, tormented, painful, joyful, sad, nostalgic, and so on." Thus, the document states the importance of learning to share and respect one's own and others' cultural heritage (e.g., express and reflect on feelings and emotions felt when listening to music).

Concerning the teaching methodology to implicitly foster critical thinking skills, the syllabus reports that it is based on a holistic approach that keeps the child at the center of the learning process. The document affirms, for teachers, the importance of paying attention to the learning process, promoting cooperation with music across classes, language sections, cycles, and European Schools, and encouraging the sharing of different ideas among pupils. Furthermore, the attainment descriptors of learning outcomes in the music syllabus implicitly include critical thinking skills. The text states that through perception each pupil can express their opinion, defend their point of view, and listen to the opinion of others with deep understanding and attention. By interpreting music, each pupil can take part with others in short musical performances and respect each other's opinions.

3.1.7. Critical Thinking Skills in the Physical Education Syllabus

Concerning critical thinking skills in learning outcomes, the Physical Education syllabus [73] implicitly reports that through team activities, pupils should learn to cooperate with others to reach a common goal, make decisions according to rules, and understand others' team strategies.

3.1.8. Critical Thinking Skills in the Religious Education Syllabus

The aim of the religious education syllabus [74–76] is to foster a European spirit in pupils through the mixing of nationalities and languages. Concerning critical thinking skills, the document explicitly stresses that pupils should learn how to ask essential ques-

tions, discuss topics critically, and look for appropriate solutions with the help of didactic resources and teachers. Additionally, this text states that religious education can facilitate a better understanding of others' beliefs through dialogue and debate. This syllabus implicitly explains critical thinking skills such as the need to learn how to identify and analyze ethical problems, look for alternative actions, analyze different strategies to find solutions, defend one's decisions, and act responsibly. Additionally, the text addresses pupils' need to reflect on personal decisions (e.g., right, and wrong decisions), develop clear ideas about one's projects and tasks, express one's experiences and ideas, listen to others and take their views into account.

Concerning teaching methodologies implicitly linked to critical thinking skills, the syllabus reports on the value of the pupils' interactive learning and group work, especially through debates and discussions.

3.1.9. Critical Thinking Skills in Ethics Syllabus

Concerning critical thinking skills, the ethics syllabus [77] states the need to help pupils build their own judgements through individual and collective reflection. This document states that to form pupils' judgement it is important to learn how to reflect on the realities of which the pupil is not immediately aware. Therefore, the role of the teacher is to guide pupils to analyze situations, draw on examples, compare different concepts, and work out the consequences of different alternatives.

Concerning the teaching methodology, the syllabus explicitly states that teachers should offer pupils opportunities to develop their critical thinking. The text stresses that the role of the teacher is to help pupils develop their initial ideas, consider complementary or opposing points of view, reflect on and consider other points of view to build a new context, and believe that all ideas are equally deserving of consideration.

Concerning learning outcomes, the syllabus explicitly mentioned critical thinking. The document states that in daily life, pupils should reflect before expressing ideas and views, demonstrate respect for the differences of others, express their own opinions, justify their choices, and compare their final decision or assessment with their classmates.

3.1.10. Critical Thinking Skills in the European Hours Syllabus

The European hours syllabus [78] fosters pupils' awareness of their national and European heritage and identity as well as global awareness and respect and care for the rights and beliefs of others through a process of comparison, questioning and debate. The document states that as citizens of Europe and the world, pupils should understand the different values and cultures around Europe from a critical thinking perspective.

Concerning the teaching methodology, the text explicitly refers to critical thinking characteristics. The document states that pupils should be taught to communicate and cooperate through project-based inquiry. Teachers should create a motivating and stimulating learning environment through activity-based and thought-provoking learning strategies. The learner must be an active participant and adopt an active role in this process.

3.1.11. Critical Thinking Skills in the ICT Syllabus

Concerning critical thinking skills, the aim of the ICT syllabus [79] is educating pupils to use multimedia to improve their presentations, cooperation (even at distance), and to acquire a critical thinking attitude towards the mass media. This syllabus has an effective methodology for teaching and learning various subjects, allowing interactive exchanges between pupils, and providing a new role for teachers. The document explains that the teacher is "no longer the sole transmitter of knowledge, but instead becomes the facilitator of didactic activity motivating pupils' work, checking their progress, suggesting, or defining learning objectives, and evaluating the achievement of the objectives" [79].

4. Discussion

The objective of this study was to explore whether critical thinking skills are included in the primary school curriculum of the European Schools' system and if so, to identify the characteristics, core skills, and approaches to critical thinking in the syllabi.

First, the primary education curriculum [64,66] and the structure for all syllabi [59] in European Schools do not adequately define the concept of critical thinking. Although critical thinking is mentioned as a fundamental educational skill to develop among pupils, the curriculum does not spell out a clear definition of critical thinking. In contrast, several studies highlight the need to define critical thinking and to use specific instructions to develop critical thinking skills in the school curriculum across the disciplines [19,22–30].

Second, concerning the characteristics of instruction to stimulate critical thinking, the primary education curriculum [64] explicitly mentions critical thinking as a key skill in the learning process. Teaching methodologies emphasize the importance of cooperative learning that allows pupils to question, discuss, share views or ideas, and, working in small or peer groups, arrive at joint conclusions. Similarly, Friesen and Scott [40] found that inquiry-based learning methods in the school curriculum require problem-solving, questioning, and working collaboratively to support critical thinking. According to Schola Europaea [59], the learning and teaching didactic principles in the syllabi that are pupil-centered and based on active learning, gradually guide pupils to become responsible for their own learning process. This is in line with a research study on school curriculum that found student-centered classrooms are an effective teaching strategy for promoting critical thinking [34]. Additionally, the curriculum describes the role of the teacher as a facilitator of pupils' learning process. This is in line with Davies [7] who found that the teachers' role as facilitator or learning adviser represents a characteristic of instruction that can foster critical thinking. This may be because the teacher promotes active learning by giving more responsibility to pupils, which then encourages pupils to express themselves freely and to discuss and share ideas in groups.

Third, following an analysis of critical thinking in the primary education subject syllabi, a broad picture of critical thinking skills in the school curriculum emerges. The syllabi describe, explicitly and implicitly, all the core critical thinking skills. In fact, all the core critical thinking skills are included in most of the syllabi in the primary school curriculum, which is encouraging. An analysis of the syllabi content suggests that some subjects contribute more than other subjects to developing pupils' critical thinking skills. Specifically, the art, discovery of the world, ethics education, languages, mathematics, music, and religious syllabi include the core critical thinking skills, which are as follows: (i) interpretation; (ii) analysis; (iii) inference; (iv) evaluation; (v) explanation; (vi) and self-regulation. This is in line with Facione [44], who proposed five steps to promote core critical thinking skills across the school curriculum. However, some syllabi have the potential to further develop critical thinking skills in the curriculum. These include the European Hours, ICT, and physical education syllabi. The study by McBride [80] asserted that physical education is extremely suitable for fostering critical thinking and research on the use of critical thinking skills in physical education showed encouraging results. However, the European hours, ICT, and physical education syllabi do not include all the core skills of critical thinking suggested by Facione's [44], specifically, interpretation, analysis, inference, and explanation across the syllabi. Trede and McEwen [36] emphasized fostering the critical thinking skill of interpretation across all syllabi and recommend the use of questioning for a deeper understanding of facts. Friesen and Scott [40] found that to foster the critical thinking skill of inference, all syllabi should have pupils' working collaboratively to solve problems.

To stimulate the critical thinking skill of evaluation in all syllabi, Smith and Higgins [43] suggested introducing peer-to-peer feedback between pupils for making preliminary decisions. To foster the skill of explanation, Burnett et al. [39] suggested that the rethinking process can provide new directions for pupils' communication and offer new opportunities for cooperation in mutual as well as remote learning, especially through

ICT. In addition, all syllabi in the primary school curriculum include the core skill of self-regulation. In fact, the curriculum includes a remarkable number of daily assessments and self-assessments that check for the pupils' understanding and continuous involvement in learning revision pathways. This is in line with Facione [44] and Salmon [42] who discussed the power of a daily routine that includes the repetition of each concept in a lesson. This process enables teachers to talk with children and children to talk with others in their group about why they are learning what they are learning; it is a process that fosters the skill of self-regulation. This global framework reflects the strong inter-relationships between critical thinking skills and how they can be reinforced when addressed through a range of teaching and learning practices in the syllabi. Thus, we found that the primary school curriculum offers support for critical thinking.

Last, concerning the critical thinking approaches outlined in the entire primary school curriculum, our study detected a holistic approach in which the European Schools system supports critical thinking as an explicit and implicit goal within a standard subject-matter content instruction. Specifically, critical thinking instruction is provided in standard subject-matter content (see Table 1) where the content is only related to discipline-specific knowledge (as an element of the infusion and immersion approaches). Accordingly, critical thinking instruction is not provided as a separate course (as an element of the general approach), nor as an independent track within a subject-specific course (as an element of the mixed approach). Additionally, in line with the reasoning of infusion approach theorists [16,45,50,81], this research study stresses the importance for the primary school curriculum to refer to critical thinking as an explicit goal with explicit instruction on how to infuse it in some subject areas. On the other hand, in line with the immersion approach, the findings of our study indicate that critical thinking instruction is also important as an implicit goal in other subject areas of primary school curriculum. Thus, in line with the immersion approach theorists [13,44,82,83], critical thinking skills are not only the focus of direct and explicit instruction for pupils who should be able to acquire these skills by engaging with the subject matter.

4.1. Methodological Limitations

We found that the primary school curriculum of the European Schools system incorporates an approach to critical thinking across the curriculum in European Union member states. Similar research can be replicated with representation from European countries that were not included in this study and from countries outside Europe. This research used a qualitative method to collect and analyze the data. Future studies can use different data gathering methods such as a survey questionnaire for policymakers (e.g., school inspectors and headmasters). The questionnaire can include questions for policymakers on their vision for embedding critical thinking in the school curricula. The survey data would help to triangulate data and build a complete framework of factors for designing a primary school curriculum on critical thinking.

4.2. Follow-Up Research

This study provides a baseline for conducting further research on critical thinking improvements across the curriculum. Although several core critical thinking skills are well-represented in most of the syllabi, future studies should ensure that each of these skills are explicitly and comprehensively infused across the whole curriculum through the infusion approach. To further investigate the infusion of critical thinking across the primary school curriculum, more qualitative research studies, augmented by other research methodologies, should be conducted. First, future research should identify (a) the characteristics of instruction that enable primary school teachers to promote critical thinking skills and (b) the main obstacles teachers face in promoting critical thinking skills. Second, future research studies should explore primary school teachers' experiences with strategies for promoting pupils' core critical thinking skills in the classroom. Finally, future research studies should investigate (a) teachers' views on critical thinking and how it is promoted in

primary education, (b) teachers' professional training, and (c) teachers' views on seminars or workshops they may have attended or materials they may have read on promoting pupils' critical thinking.

Author Contributions: Conceptualization, L.L.; methodology, L.L.; formal analysis, L.L.; investigation, L.L.; data curation, L.L.; writing—original draft preparation, L.L., F.J.M., F.D.B. and K.L.; writing—review and editing, L.L., F.J.M., F.D.B. and K.L.; visualization, L.L.; supervision, F.D.B. and K.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are not publicly available due to the confidential information involved, as per the confidentiality agreement established with the participants.

Conflicts of Interest: The authors declare no conflict of interest.

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