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SCHOOL

***THE DEVELOPMENT OF SELF-
ASSESSMENT CAPACITY THROUGH THE USE
OF CRITICAL THINKING METHODS IN EARLY
PRIMARY EDUCATION***

SUMMARY

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Summary of the Doctoral Thesis Entitled

DEVELOPING SELF-ASSESSMENT SKILLS THROUGH THE USE OF CRITICAL THINKING METHODS AMONG PRIMARY SCHOOL PUPILS

Keywords: critical thinking, self-assessment, learning methods, student-centred learning, primary school pupils, active learning, questioning.

Motivation for Choosing the Research Topic

The teaching–learning process aims to develop pupils’ knowledge, abilities, skills, and competencies. Critical thinking enables pupils to consider a wide range of perspectives, information, and possible courses of action. It may be understood as a complex capacity for processing information, involving analysis, interpretation, and evaluation, with the purpose of formulating well-reasoned conclusions. Within this framework, information is not accepted automatically but is subjected to a reflective process aimed at verifying its validity and preventing the adoption of erroneous ideas. The development of this competence requires the inclusion of appropriate activities from the earliest stages of education, beginning at preschool level and continuing throughout primary education. Pupils who develop critical thinking demonstrate greater effectiveness in problem-solving, including in mathematical contexts, as well as an enhanced ability to comprehend written texts without relying predominantly on memorisation.

Since critical thinking involves self-analysis, self-reflection, and self-awareness, it plays an essential role in the formation and development of self-assessment skills. The purpose of self-assessment is to enable pupils to become aware of their own abilities and knowledge through a process of self-discovery. Encouraging pupils to examine their own achievements helps them identify the areas in which further effort and attention are required. Self-assessment may take various forms, including verbal self-appraisal, self-expression through drawing or songs, and teacher-supervised self-grading. During the assessment process, it is important for teachers to consider both the learning process and the final product.

The review of the literature revealed a limited number of studies addressing a research topic similar to the one proposed in this thesis. Although the literature includes extensive research on critical thinking and self-assessment as separate areas of study, relatively few studies demonstrate the relationship between the development of critical thinking and the improvement of self-assessment skills.

Accordingly, the proposed intervention programme was designed to develop pupils' critical thinking and to examine the corresponding development of their self-assessment skills. The FAIR intervention programme—comprising Training, Application and Development, Error Identification, and Daily Reflection—was implemented with pupils aged between 10 and 11 years, corresponding to Grade 4 of primary education. The programme was based on the development of a methodological framework for fostering critical thinking through the use of specific teaching methods, with the aim of enhancing both critical thinking and self-assessment skills.

This doctoral thesis seeks to address the following research questions:

- How can critical thinking be developed among primary school pupils?
- Does the development of critical thinking also lead to an improvement in pupils' self-assessment skills?
- Which teaching methods can be used to foster critical thinking?
- What is the relationship between critical thinking and self-assessment skills?

Structure of the Thesis: The doctoral thesis entitled *The development of Self-Assessment Capacity through the Use of Critical Thinking Methods in early Primary School Pupils* is organised into two main sections: a theoretical section, in which the key concepts are examined and developed (Chapters I–II), and a section intended for the intervention programme (Chapters III–IV). The thesis begins with an introductory section and concludes with the references and the corresponding appendices.

PART I. THEORETICAL ANALYSIS

CHAPTER I. DEVELOPING SELF-ASSESSMENT SKILLS AMONG PRIMARY SCHOOL PUPILS

Chapter I focuses on the development of the concept of self-assessment skills. Since self-assessment is a component of formative assessment, Sections I.1 and I.2 address the topics of educational assessment and formative assessment.

Assessment is a fundamental process through which the connection between the education system and society is established, as it serves to communicate and validate the level of learning acquired by individuals. It occurs in a wide range of contexts, from everyday and informal situations to institutionalised practices such as school reports, examinations, and professional selection procedures. Regardless of the form it takes, assessment ultimately aims to evaluate knowledge, skills, abilities, and competencies, thereby providing relevant information for educational and social decision-making.

According to Constantin Cuciş (2008), educational assessment is an essential instrument of the educational process, enabling teachers to collect and interpret information concerning pupils' level of knowledge and academic performance. By using this information, teachers can identify the difficulties encountered by pupils and adopt appropriate measures to regulate and optimise the teaching–learning process.

In the current literature, authentic assessment is promoted as an assessment approach centred on the completion of tasks that have practical relevance and closely reflect situations encountered in real life and professional contexts. Through this approach, assessment goes beyond verifying the extent to which knowledge has been acquired and contributes to the development of transversal and professional competencies, such as critical thinking, problem-solving, and the effective application of knowledge across a variety of contexts.

Within the educational context, assessment takes three main forms: initial assessment, formative assessment, and summative assessment.

Formative assessment occupies a central role in pre-university education, as it is conceived as a continuous process of monitoring and regulating learning. Conducted through a variety of methods, including systematic observation, oral and written assessments, projects, portfolios, and self-assessment, it provides relevant information regarding pupils' progress. Through continuous feedback and sustained interaction between teacher and pupil, formative assessment supports the identification of learning difficulties and the adaptation of teaching

interventions, thereby contributing to the optimisation of the educational process and the improvement of academic achievement.

Within modern assessment strategies, complementary methods play an important role by contributing to the diversification of assessment practices and to their adaptation to the specific characteristics of the learning process. Among these methods, self-assessment stands out as a complementary approach that encourages pupils' active involvement in evaluating their own performance and monitoring their individual progress. Alongside reports, investigations, projects, portfolios, and systematic observation, self-assessment complements traditional assessment methods and provides teachers with relevant information for regulating and optimising the educational process.

Self-assessment is recognised in the literature as an essential component of formative assessment, the two processes being complementary in supporting self-regulated learning. Beyond its traditional function of measuring performance, formative assessment creates learning contexts based on continuous feedback and reflection on individual progress. Within this framework, self-assessment involves pupils in monitoring and evaluating their own results by comparing them with established learning objectives and assessment criteria. It therefore contributes to the development of autonomy and self-regulation and to the optimisation of the learning process.

Pupil motivation represents an essential component in the development of self-assessment skills. Motivation is influenced by both internal and external factors, which shape each pupil's level of engagement.

The development of self-assessment skills is influenced by a range of internal factors, among which the affective-motivational and evaluative components play a central role. These two dimensions operate interdependently, contributing both to a realistic appraisal of one's own results and to the strengthening of the self-regulatory mechanisms involved in the learning process.

External factors include the teacher's assessment of pupils' performance, their peers' opinions, and the evaluations provided by parents. Self-assessment skills develop under the influence of external factors that shape pupils' perceptions of their own performance (Stan, 2001). Among these factors, the assessment and feedback provided by teachers represent essential reference points for validating pupils' self-evaluative judgements and developing an objective understanding of their academic progress within a learning-oriented formative assessment framework. Furthermore, interactions with peers and the feedback received from them contribute to the development of self-image and to the adjustment of the manner in which

pupils evaluate their own results, thus highlighting the importance of an educational climate based on cooperation and mutual respect. At the same time, the family environment influences the self-assessment process through parents' attitudes and responses to academic performance, playing an important role in the development of balanced self-assessment and in strengthening pupils' confidence in their own abilities.

Another essential component in the development of self-assessment skills is the influence of self-esteem.

Self-image is the outcome of the process through which individuals construct their perception of themselves and evaluate their own characteristics and performance. Within the school environment, self-image is shaped by both the assessment conducted by the teacher and the pupil's own self-assessment practices. The development of self-image involves the interaction of three complementary dimensions of the self—cognitive, affective, and behavioural—which influence one another and support the development of balanced and realistic self-assessment skills.

The active involvement of pupils in the assessment process represents an essential step towards increasing their engagement in learning. The understanding that assessment and learning are necessarily interconnected places equal emphasis on their reciprocal relationship. Assessment, particularly through the processes of judging and prioritising concepts, ideas, facts, and the relationships among them, constitutes an integral part of learning.

Self-assessment can be integrated into most learning activities, consistently providing pupils with opportunities to identify and reflect on their progress in relation to specific learning outcomes.

Self-assessment constitutes a form of internal assessment through which pupils analyse and evaluate their own abilities and results, in contrast to external assessment, which is based on judgements formulated by others. In contemporary education, the development of self-assessment competence represents an essential direction of the educational process, as it supports the development of autonomy, encourages pupils to assume responsibility for their learning, and strengthens their ability to make informed decisions regarding their own learning pathways.

At the same time, self-assessment involves pupils' active participation in evaluating the quality of their own performance by comparing it with established assessment criteria. This process stimulates critical reflection on the results obtained and supports the continuous monitoring and regulation of learning (Mudi, 2024).

The use of self-assessment within the assessment process is grounded in theories of self-regulated learning, which emphasise pupils' capacity to set specific objectives and evaluate their own learning process as a metacognitive basis for improving learning outcomes. Self-regulation refers to the self-generated metacognitive, motivational, and behavioural processes through which individuals transform their personal abilities into the capacity to exercise control over outcomes across a variety of contexts.

Section I.6 presents methods and strategies for developing self-assessment skills. Pedagogical theory and practice highlight several approaches to fostering self-assessment, among which the most commonly used are self-correction, peer correction, teacher-supervised self-grading, and peer grading. The effective implementation of these methods requires clearly defined performance criteria and descriptors that are understood by pupils and that ensure the objectivity of the assessment process.

Self-correction and peer assessment contribute to the identification of errors, awareness of one's own level of competence, and the development of autonomy in learning. However, these methods require teacher guidance and an educational environment based on collaboration and trust. Similarly, self-grading and peer grading encourage pupils' involvement in the assessment process and foster responsibility for their own performance.

Regardless of the method used, the self-assessment grid constitutes an essential instrument, as it facilitates the analysis of pupils' results in relation to learning objectives and assessment criteria. It also supports the identification of strengths and difficulties, as well as the regulation of the learning process.

In conclusion, self-assessment emerges as a defining component of formative assessment and as an indispensable complementary method within educational assessment, owing to its contribution to the development of pupil autonomy and the capacity for self-regulated learning. The formation of this competence results from the interaction between internal factors, such as motivation, self-image, and critical reflection on one's own performance, and external factors, including teacher feedback, peer-group influence, and family support. When systematically implemented through specific methods and instruments, self-assessment facilitates the development of a realistic appraisal of one's own results, strengthens pupils' responsibility for their educational progress, and supports the continuous optimisation of the learning process.

CHAPTER II. THEORETICAL AND PEDAGOGICAL FOUNDATIONS OF THE DEVELOPMENT OF CRITICAL THINKING AMONG PRIMARY SCHOOL PUPILS

The second chapter focuses on the conceptual delineation of critical thinking, the cognitive characteristics of primary school pupils, the formation and development of critical thinking, the metacognitive strategies involved in this process, and the teaching methods and strategies that may be used to foster it.

The first part of the chapter provides a conceptual clarification of critical thinking by examining theoretical models proposed both by established scholars and by contemporary authors in the field.

The concept of critical thinking has been developed and consolidated through the contributions of prominent scholars such as Robert Ennis, Richard Paul, Linda Elder, and Matthew Lipman, who played an essential role in defining, theoretically grounding, and operationalising this construct. Contemporary literature highlights a wide range of perspectives on critical thinking, reflecting the complex and multidimensional nature of the concept. Accordingly, the principal theoretical models are presented in chronological order in order to illustrate the conceptual evolution of critical thinking and to identify the fundamental landmarks in the development of this field of research.

The contributions of Robert Ennis, Richard Paul, Linda Elder, and Matthew Lipman have played a decisive role in the development and consolidation of the theoretical framework of critical thinking. From this perspective, Robert Ennis (1989) defines critical thinking as a reflective, rational, and deliberative process aimed at formulating judgements and making decisions based on the rigorous analysis and evaluation of information. The approach proposed by Richard Paul and Linda Elder (2005) emphasises the need to apply intellectual standards such as clarity, accuracy, relevance, and logic, thereby providing an operational model that facilitates the development and assessment of critical thinking skills in educational contexts. This perspective also highlights the importance of identifying and correcting one's own reasoning errors, thus contributing to the development of autonomous and responsible thinking. Complementing these approaches, Matthew Lipman (1987) integrates the creative dimension into the structure of critical thinking, arguing that the formulation of valid judgements requires reference to explicit criteria, continuous self-correction, and openness to alternative perspectives.

The theoretical models developed by these authors therefore emphasise the multidimensional nature of critical thinking and its relevance to the educational process, in

which analysis, argumentation, reflection, and the use of objective criteria represent essential prerequisites for the development of intellectual competencies and the formulation of well-reasoned decisions.

Contemporary perspectives define critical thinking as a complex and multidimensional construct integrated into current models of education and cognitive science. Within a knowledge-based society, critical thinking is regarded as an indispensable competence for lifelong learning and for adapting to the demands of a dynamic information environment.

The conceptual evolution of critical thinking reflects a transition from an exclusive emphasis on the cognitive processes of analysis, evaluation, and inference towards an approach that assigns equal importance to metacognitive, affective, and dispositional dimensions. In educational contexts, critical thinking constitutes a fundamental component of student-centred pedagogical models and is fostered through active and collaborative teaching strategies. Although the literature presents diverse perspectives on this concept, there is broad agreement regarding its importance in formulating reasoned judgements, solving problems, and making decisions through the engagement of reasoning, argumentation, and the cognitive processes involved in analysing information.

The chapter continues by examining the cognitive characteristics of primary school pupils. The primary school period, corresponding approximately to the ages of 6 to 11, represents a defining stage in children's development, characterised by their integration into the educational environment and their adaptation to the specific demands of school activities and social life. During this stage, fundamental acquisitions such as reading, writing, and mathematical calculation are consolidated, while autonomy, responsibility, and active involvement in the learning process are progressively developed.

Cognitive development is accompanied by the maturation of the main psychological processes. Attention becomes increasingly stable and focused, memory gradually shifts towards the use of strategies for memorising and organising information, and language develops both through the enrichment of vocabulary and through the improvement of communication, argumentation, and expressive skills.

At this age, thinking operations are predominantly concrete, and their successful application depends on tangible and observable information. At the beginning of formal schooling, teachers use various forms of visual support to facilitate pupils' understanding of the content (Kohn, 2020). Gradually, pupils become able to reason about problem situations even when the relevant objects are no longer directly present in their visual field. Abstract situations remain difficult to understand at this stage. At approximately 7–8 years of age, pupils

understand the concept of quantity with the support of specific teaching materials; by the ages of 9–10, they begin to understand weight, while the concept of volume is generally comprehended between the ages of 11 and 12.

Successful adaptation to the demands of the school environment is facilitated by cooperation between the family and the teacher, both of whom provide cognitive and emotional support, thereby contributing to the child's harmonious development and to the formation of the competencies required throughout their educational pathway.

Section II.3 presents the specific characteristics of critical thinking, highlighting the attributes that distinguish individuals who think critically. Norris and Ennis (1989) describe a range of characteristics associated with critical thinkers.

According to their perspective, critical thinking is expressed through a combination of cognitive skills and intellectual dispositions that enable the rigorous evaluation of information and the formulation of well-founded judgements. Critical thinkers seek relevant information from credible sources, construct arguments based on evidence, examine different perspectives, and organise their reasoning in a logical and coherent manner. They are also open to alternative viewpoints, willing to revise their conclusions when confronted with valid arguments, and capable of adapting their discourse to the particularities of the context and their interlocutors. These characteristics reflect cognitive flexibility, intellectual responsibility, and a constructive attitude within the argumentative process.

Ennis also developed the FRISCO model, an acronym for Focus, Reasons, Inference, Situation, Clarity, and Overview. The model begins by focusing on the problem and identifying the main issue, followed by analysing the underlying reasons and formulating evidence-based arguments. Inference plays an essential role, as it involves assessing the relationships between premises and conclusions, as well as the validity of the reasoning process. Critical thinking also requires continuous consideration of the context in which judgements are formulated, including the personal, social, and situational factors that may influence decision-making. Clarity of expression and the continuous evaluation of one's own cognitive process complete the model, supporting the formulation of coherent, well-reasoned conclusions that are appropriate to the context under examination.

Thus, individuals who develop critical thinking skills are able to understand reality and its underlying mechanisms more accurately and are consequently better equipped to make relevant and well-founded decisions.

The chapter subsequently presents theoretical principles concerning the formation and development of critical thinking within instructional and educational activities conducted with primary school pupils.

The development of critical thinking in educational contexts depends on the existence of an open and supportive learning environment that encourages the expression of opinions, the justification of reasoning, and pupils' active involvement in the construction of knowledge. Such an environment promotes cognitive engagement, strengthens motivation for learning, and facilitates an understanding of the aims of teaching activities.

Within this process, the teacher plays an essential role by designing instructional approaches aimed at developing critical thinking, employing a shared language that supports communication, and cultivating pupils' analytical, reflective, and argumentative competencies. The teacher also serves as a model of critical reasoning by demonstrating, through their own methods of analysis and decision-making, intellectual behaviours that encourage the development of autonomous, reflective, and evidence-based thinking.

The development of critical thinking depends on pupils' ability to express their opinions, provide arguments, and consider alternative perspectives. To develop these abilities, teachers must consistently encourage dialogue among pupils. Active participation in conversations may be difficult for shy or introverted pupils; consequently, teachers must provide appropriate support and create suitable conditions for every pupil to become involved in the interactions proposed within the educational process.

Section II.6 examines the contribution of Bloom's revised taxonomy to the development of critical thinking. Bloom's revised taxonomy, proposed by Anderson and Krathwohl (2001), is recognised as one of the most relevant conceptual frameworks for organising educational objectives and the cognitive processes involved in learning. Within this model, critical thinking is primarily associated with the higher-order cognitive processes of analysing, evaluating, and creating. These processes involve examining information from different perspectives, identifying relationships among ideas, formulating reasoned judgements, and developing original solutions.

From this perspective, the development of critical thinking requires pupils to move beyond basic cognitive processes, such as remembering and understanding, and to engage in complex intellectual activities requiring reflection, argumentation, and evidence-based decision-making.

Furthermore, the revised taxonomy represents an important reference framework for the design of teaching activities, providing teachers with a structure for organising learning

experiences that stimulate critical thinking. By using tasks involving the analysis, comparison, justification, and evaluation of information, teachers create contexts that support the development of reflection, problem-solving, and decision-making skills.

Another essential aspect of developing critical thinking is inquiry-based learning, which involves both the questions asked by teachers to guide learning and the encouragement of pupils to formulate their own questions in order to explore and understand the learning content.

Although the development of critical thinking remains a constant concern in education, pupils' limited participation in the learning process continues to represent a frequently encountered difficulty. In many situations, information is memorised without being analysed in depth or connected to previously acquired knowledge. Under these circumstances, teachers are responsible for designing instructional approaches that promote pupils' active engagement, while the use of pedagogical questions represents an effective strategy for stimulating reflection and participation. By formulating relevant questions, teachers encourage pupils to analyse information, support their viewpoints, construct arguments, and make effective use of the feedback received. These processes contribute to the development of critical thinking and increase the effectiveness of the educational process.

The traditional approach to questioning in teaching–learning activities involves the teacher asking a question, after which pupils who know the answer raise their hands and one pupil is selected to respond. This practice demonstrates that teacher-generated questions often allow only a single answer to be presented, without necessarily engaging pupils in a dialogue capable of stimulating their interest and active participation.

For this reason, contemporary educational standards promote the use of open-ended questions, through which pupils are encouraged to participate actively in their own learning process.

Section II.7.2 presents questioning techniques designed to stimulate critical thinking. The initial stage involves establishing the learning objectives. Pupils are informed about the intended outcomes of the teaching–learning process and are also encouraged to set their own objectives in relation to their individual performance.

Ciolan (2013) emphasised that teachers must ensure that pupils do not merely memorise the information they receive but process it logically and understand it. When this process occurs, pupils move beyond the role of passive listeners and become active participants in their own learning.

The effective use of questions in teaching activities requires their careful design so that they stimulate complex cognitive processes, including analysis, reflection, and argumentation,

rather than merely requiring the reproduction of information. Priority should therefore be given to the formulation of relevant and challenging questions that facilitate an in-depth understanding of the content and support the development of critical thinking.

Guiding questions also encourage pupils' active participation, strengthen teacher–pupil interaction, and promote the ability to formulate questions independently. When questions require complex reasoning, pupils should be provided with sufficient reflection time. Such questions may also be presented visually in order to support the analysis of task requirements and the formulation of coherent, well-reasoned, and appropriately substantiated responses.

The teacher's coordinating role is essential in ensuring the full participation of all pupils. At the same time, the feedback provided by the teacher directly influences learning effectiveness, motivation, and pupils' confidence in their own abilities. Clear and constructive feedback encourages active participation and supports progress, whereas unclear or excessively critical responses may reduce engagement and increase anxiety. Depending on the situation, the teacher may reformulate questions, provide additional prompts, request that answers be expanded, or confirm correct responses through verbal and non-verbal reinforcement. Feedback therefore contributes to the regulation of the learning process and to the development of critical thinking.

Four assessment methods are proposed for evaluating critical thinking: multiple-choice tests, extended-response questions, direct observation of pupils, and pupil and teacher journals.

Assessing the level of critical thinking requires the use of diverse methods, each of which captures different dimensions of cognitive activity. Multiple-choice tests are often preferred because of their objectivity and the ease with which they can be administered and scored; however, they provide only limited insight into pupils' argumentative processes. By contrast, open-ended items enable an in-depth analysis of pupils' ability to interpret information, construct arguments, and solve complex problems, although their assessment is more time-consuming and requires a higher level of pedagogical expertise.

Methods such as direct observation and reflective journals further complement the assessment process by revealing how critical thinking is manifested in authentic learning contexts and by drawing on pupils' reflections. Nevertheless, the results obtained through these methods may be influenced by the subjective nature of interpretation and by the diversity of the information collected.

Metacognitive strategies, discussed in Section II.9, represent a central component in the development of critical thinking. Metacognition is commonly conceptualised as “knowledge about knowledge”. According to Flavell (1979), it comprises two fundamental components:

metacognitive knowledge and metacognitive experiences. Metacognitive knowledge refers to the information individuals possess about their own cognitive processes and use to control and regulate them. Metacognitive experiences involve the activation of specific strategies, organised sequentially within cognitive activities, in order to facilitate understanding.

Metacognition is recognised as a significant competence in the development of critical thinking. However, this perspective predominantly focuses on the cognitive dimension and gives limited consideration to the influence of the educational context. In this respect, the sociocultural environment plays an important role in shaping learning processes. It may therefore be argued that the development of critical thinking involves not only the use of appropriate cognitive strategies but also the existence of a safe, supportive, and inclusive educational environment.

Thinking comprises both cognitive and non-cognitive components. The cognitive component involves processes such as perception, memory, and learning, whereas non-cognitive processes include motivation and interest. Metacognition occupies an intermediate position between these two dimensions because it involves both the evaluation of thinking and the regulation and improvement of its effectiveness. Both components are fundamental to critical thinking, as cognitive skills and intellectual dispositions are insufficient when considered separately.

Research on critical thinking has consistently highlighted the multidimensional nature of the concept, which integrates cognitive, metacognitive, and attitudinal processes. Recent research directions have placed greater emphasis on its practical dimension, demonstrating that the development of metacognitive competencies supports not only critical thinking but also improved academic performance and the capacity for self-regulated learning. In the context of the growing use of artificial intelligence-based tools, metacognition is becoming an essential mechanism for active engagement in information processing, as it promotes reflection and the critical analysis and evaluation of automatically generated content (Singh, Guan, and Rieh, 2025).

Metacognitive processes therefore contribute to the development of autonomous and reflective thinking by reducing the tendency to accept information uncritically and by supporting the responsible use of digital technologies.

Thus, metacognition plays an essential role in the development of critical thinking, as it involves individuals' awareness of their own cognitive processes with the aim of improving them and facilitating the effective acquisition of knowledge.

Since the thesis focuses on developing critical thinking through the use of specific teaching methods, Section II.10 presents instructional methods that may be employed for this purpose. These methods incorporate elements that require critical thinking, including the formulation of objectives, analysis, induction, deduction, and the formulation of independent judgements and conclusions.

The teaching methods were selected following a review of the literature supporting the development of critical thinking. Nevertheless, their mere application is not sufficient. To ensure their effectiveness, consideration must also be given to the manner in which activities are implemented, the level of involvement of both pupils and teachers, and the existence of a favourable educational environment.

When designing an instructional approach aimed at fostering critical thinking, the ERR framework represents a valuable methodological tool for organising a learning process oriented towards the development of critical thinking. Structured around the stages of Evocation, Realisation of Meaning, and Reflection, this framework promotes a student-centred educational process by supporting knowledge construction and the development of higher-order cognitive processes (Facione, 2011).

The ERR framework provides the structure required for the development of critical thinking. Relating this model to Bloom's revised taxonomy demonstrates that it engages different cognitive levels, thereby contributing to the development of critical thinking competencies.

The selected teaching methods include brainstorming, starbursting, sticky notes, concept mapping, Venn diagrams, scenarios, the Six Thinking Hats, the PMI technique, the double-entry journal, debate, and the RAI method. These methods support the development of various dimensions of critical thinking by engaging cognitive and metacognitive processes that are fundamental to effective learning.

These methods provide valuable opportunities for developing critical thinking; however, their impact depends largely on how they are implemented within the teaching process. Although they promote a wide range of competencies, skills, and modes of thinking, their contribution to critical thinking is determined by their integration into activities that encourage reflection, analysis, and argumentation. Teachers play an essential role in this process by effectively organising and coordinating the educational approach. Furthermore, a learning environment based on trust, safety, and collaboration stimulates pupils' active engagement and motivation, thereby fostering the development of authentic critical thinking.

The second chapter concludes with an analysis of the interdependence between critical thinking and self-assessment skills. Edwards (2005) examined the effects of a pedagogy oriented towards the development of thinking skills on the learning process, highlighting that pupils become capable of supporting their opinions with arguments and evidence while simultaneously constructing learning models grounded in constructivist principles.

In contemporary approaches, critical thinking is defined as the ability to analyse, interpret, and evaluate information in order to formulate well-reasoned judgements and decisions. It involves identifying errors in reasoning, assessing the validity of arguments, and drawing logical conclusions, thus playing an essential role in the intellectual and cognitive development of primary school pupils. Current research indicates that the development of critical thinking is supported by metacognitive processes, which enable pupils to monitor and regulate their own learning. At the same time, self-assessment skills promote autonomy, the effective use of learning strategies, and improved academic performance.

Throughout the educational process, pupils encounter difficulties particularly during the assessment and reflection stages. Consequently, the development of critical thinking contributes directly to strengthening self-assessment skills by providing the cognitive support required for analysis and self-reflection.

In conclusion, self-assessment has been approached as an important element in the development of critical thinking, which, in turn, plays a central role in the formation of metacognition. Self-assessment skills guide pupils in monitoring and regulating their learning activities, enabling them to become aware both of their own performance and of the gaps in their knowledge that may hinder their development. Thus, self-assessment is not limited to an evaluative function but also contributes to the development of autonomy and responsibility within the learning process.

PART II. EMPIRICAL RESEARCH

CHAPTER III. STRATEGIES FOR DEVELOPING SELF-ASSESSMENT SKILLS THROUGH THE USE OF CRITICAL THINKING

Chapter III begins with literature review carried out to inform the selection and definition of the research topic. The literature review involved identifying areas that had received insufficient scholarly attention in order to establish the direction of the present research. Thirty articles relevant to the topic were selected and analysed. The analysis identified studies highlighting the relationships between reflection, self-regulation, metacognition, and the development of critical thinking, which may provide a theoretical link to self-assessment. Nevertheless, self-assessment skills were rarely addressed as the central focus of the studies examined. The present research was therefore undertaken to provide a more in-depth analysis of the interdependence between self-assessment skills and critical thinking.

The empirical research was organised into two complementary components, each serving a distinct role in achieving the objectives of the investigation. The diagnostic component explored teachers' perceptions regarding the use of critical thinking methods in instructional and educational activities, as well as their contribution to the development of self-assessment skills and academic performance. The findings provided the conceptual and methodological basis for designing the FAIR intervention programme. The subsequent experimental component aimed to test the research hypotheses and evaluate the effects of the intervention programme. It was structured into three successive stages: pre-experimental, experimental, and post-experimental.

The research focused on examining the impact of the FAIR intervention programme, which was based on the development of a methodological framework for fostering critical thinking with the aim of improving self-assessment skills.

The research objectives were as follows:

- To analyse teachers' views regarding the importance of using critical thinking to develop self-assessment skills.
- To conduct a focus group in order to analyse the interactive teaching methods used in the teaching–learning process.
- To design an intervention programme based on the use of teaching methods specific to critical thinking in order to develop self-assessment skills.
- To process the data obtained through the administration of the Cornell Critical Thinking Test and the self-assessment grid, as well as through the analysis of the National Assessment results.

- To identify the initial level of critical thinking among the pupils included in the research by conducting a critical thinking test during the pre-experimental stage.
- To identify pupils' initial level of self-assessment skills by using the self-assessment grid associated with the assessments administered during the pre-experimental stage.
- To highlight the impact of the intervention programme on academic performance by analysing pupils' results in ongoing assessments and in the Grade 4 National Assessment.
- To establish the relationships among critical thinking, self-assessment skills, and academic performance among primary school pupils.

The general hypothesis proposed for the experiment was as follows:

The systematic implementation of the FAIR intervention programme (Formulation of Objectives, Application and Development, Identification of Errors, and Reflection of the Day) grounded in the methodological framework of critical thinking, contributes significantly to the development of self-assessment skills, critical thinking, and academic performance among primary school pupils in the developmental curricular cycle.

The specific hypotheses were as follows:

- The implementation of an intervention programme based on the methodological framework of critical thinking produces a significant increase in the level of critical thinking among primary school pupils.
- The implementation of an intervention programme based on the methodological framework of critical thinking produces a significant improvement in self-assessment skills among primary school pupils.
- The implementation of an intervention programme based on the methodological framework of critical thinking produces an improvement in the academic performance of primary school pupils.

The thesis includes the following variables:

- **Independent variable:** the intervention programme based on the use of teaching methods specific to critical thinking for the development of self-assessment skills.
- **Dependent variables:**
 1. Critical thinking skills and the metacognitive strategies involved in learning, including induction, deduction, observation, credibility assessment, and hypothesis formulation.
 2. The self-assessment skills of pupils in the developmental curricular cycle.
 3. The results obtained in the National Assessment.

The research was conducted in two pre-university educational institutions located in the urban area of Arad, Arad County.

The selection of the educational institution was based on the availability of favourable conditions for conducting experimental research and on the possibility of systematically implementing critical thinking methods in regular teaching activities. The institution from which the control group was selected was chosen according to the same criteria in order to ensure the comparability of the conditions under which the research was conducted.

The research was carried out throughout the 2023/2024 school year. It was organised into several successive stages and based on a mixed research design incorporating diagnostic and qualitative components.

1. The diagnostic research was conducted in September 2023. A focus group involving teachers was organised to explore their perceptions regarding the use of critical thinking methods in teaching activities and the role of these methods in developing self-assessment skills and academic performance.
2. The experimental research was conducted in the following stages:
 - **Pre-experimental stage:** 2 - 13 October 2023 - the initial assessment instruments were administered.
 - **Experimental stage:** October 2023 - May 2024 - the intervention programme was implemented.
 - **Post-experimental stage:** 3 - 14 June 2024 - the assessment instruments were administered again.

In order to assess the impact of the intervention on academic performance, both the results obtained in ongoing assessments and those recorded in the Grade 4 National Assessment at the end of the 2023/2024 school year were analysed.

Section III.7 is devoted to the research methods and instruments. Within this framework, the investigative approach integrated experimental methods designed to reveal the relationships among the variables under examination, together with diagnostic and assessment methods that enabled the determination of the initial levels and the monitoring of the changes recorded throughout the research.

The survey method was employed in the diagnostic component of the research and was implemented through a focus group interview. The data collection instrument was a protocol designed specifically for this type of interview. The purpose of the focus group was to identify teachers' perceptions regarding the use of methods for developing critical thinking in instructional and educational activities, as well as the influence of these methods on the

development of self-assessment skills and the academic performance of primary school pupils. The results obtained during this stage also provided the basis for designing the experimental approach and developing the intervention programme.

The experimental research began with the pre-experimental stage, during which pedagogical assessment was used as the research method to determine pupils' initial levels of critical thinking and self-assessment skills. The following research instruments were employed:

- **The Cornell Critical Thinking Test**, administered to determine pupils' initial level of critical thinking.
- **The Self-Assessment Grid**, attached to the formative assessment tasks used in the educational process and employed to identify pupils' initial level of self-assessment skills.

The purpose of using these instruments was to establish the initial levels of critical thinking and self-assessment skills within the participant sample.

During the experimental stage, the pedagogical experiment was employed as the primary research method through the implementation of an intervention programme based on the use of critical thinking methods in regular teaching activities. The purpose of the intervention was to integrate methods specific to critical thinking into the instructional process in order to foster critical thinking and self-assessment skills and to monitor academic performance.

During the final, post-experimental stage of the research, pedagogical assessment was used to determine pupils' final levels of critical thinking, self-assessment skills, and academic performance, with the aim of identifying the changes produced by the intervention. Statistical methods were employed to process and interpret the data, allowing comparisons to be made between the pre-experimental and post-experimental stages in order to test the research hypotheses. The instruments used during this stage were the Cornell Critical Thinking Test, the self-assessment grid, and the National Assessment tests.

The instruments used throughout the research were subsequently presented and examined in detail.

1. **The Cornell Critical Thinking Test (Level X)** is intended for assessing pupils and students aged between 9 and 19 and was used in the present research because of its compatibility with the age group under investigation. The instrument consists of 71 multiple-choice items and assesses the principal components of critical thinking, including induction, deduction, argument evaluation, observation, assessment of

information credibility, identification of assumptions, and conceptual understanding. Developed by Robert H. Ennis, the test is grounded in the view that critical thinking is a process of reflection and reasoning aimed at formulating well-founded judgements and decisions. It is one of the most widely used instruments for assessing this competence.

The full thesis provides a detailed analysis of the test, presenting each section, its specific components, and relevant examples.

2. In order to assess the level of development of pupils' self-assessment skills, a self-assessment grid was designed and administered following seven assessments conducted throughout the instructional and educational activities. Its purpose was to monitor the development of this competence over time. The first two administrations constituted the initial assessment stage and took place before the implementation of the intervention programme.

Following the completion of this stage, the FAIR programme was implemented. At the midpoint of the intervention period, the self-assessment grid was administered again in order to monitor changes in pupils' self-assessment skills and to identify their progress in the context of the development of critical thinking through the proposed educational intervention. The self-assessment grid was used to examine the degree of correspondence between pupils' evaluations of their own performance and the assessments made by the teacher, thereby allowing the identification of three forms of self-assessment: realistic self-assessment, underestimation, and overestimation.

3. **The National Assessment** constituted the third research instrument. It was used at the end of the study to examine the impact of critical thinking and self-assessment skills on academic performance. These assessments focus on the knowledge, attitudes, and abilities that pupils are expected to acquire, as well as on problem-solving. Pupils are placed in situations derived from everyday life for which they are required to identify appropriate solutions.

The items included from the National Assessment were selected according to a functional criterion. Only those items involving processes of analysis, interpretation, argumentation, and self-regulation of learning (processes characteristic of critical thinking and self-assessment skills) were included. This methodological decision enabled a more rigorous assessment of the impact of the intervention on the targeted competencies and prevented the observed effects from being diminished through the inclusion of items primarily designed to assess factual or procedural knowledge.

The full thesis presents both National Assessment tests the Romanian Language and Literature test and the Mathematics test and analyses each item selected for inclusion, together with the rationale for its selection and its relationship to the research topic.

Section III.8 presents the research sample, beginning with the participant sample, which was selected according to specific criteria, including the participants' age, the location of the schools they attended, and gender homogeneity. The overall sample consisted of 85 pupils from the developmental curricular cycle, of whom 42 formed the experimental group and 43 formed the control group. All participants attended urban schools with comparable educational and social profiles in order to support the validity of the results. The pupils followed the same national curriculum, ensuring that the teaching-learning process was similar across the two groups and that they benefited from equal opportunities for learning and for developing the competencies prescribed by the curriculum.

The participant sample selected for the diagnostic research consisted of 15 primary school teachers. These included teachers working with Grade 4 pupils in both rural and urban settings and possessing different levels of pedagogical training and professional experience.

The content sample initially involved the development of a conceptual model based on a review of the literature to identify appropriate teaching methods, an analysis of the primary education curriculum, the training and involvement of teachers, and the design of the FAIR intervention programme. The acronym FAIR refers to Formulation of Objectives, Application and Development, Identification of Errors, and Reflection of the Day.

The conceptual model of the intervention programme was applied during the first two weeks of the experiment in order to identify any shortcomings. Following an analysis of this initial period, minor adjustments were made to the programme. These included revising the list of methods and providing teachers with more detailed training. The final version of the programme was subsequently implemented throughout the remaining weeks of the experiment.

The intervention programme was conducted throughout the entire experimental period and was implemented daily during instructional and educational activities, thereby establishing a methodological framework for the development of critical thinking.

The teaching methods analysed and selected for inclusion in the intervention programme were as follows:

1. Know/Want to Know/Learned
2. Scenarios
3. Brainstorming
4. The Six Thinking Hats

5. Sticky Notes
6. Concept Mapping
7. RAI (Respond–Throw–Ask)
8. PMI (Plus–Minus–Interesting)
9. The Double-Entry Journal
10. Starbursting
11. The Venn Diagram
12. Debate

The implemented FAIR intervention programme comprised the following phases:

1. **Formulation of Objectives.** This phase took place at the beginning of the school day, during the organisational stage or the introduction to the day's activities. The methods selected for this stage were designed to encourage pupils to formulate objectives for the respective day and included sticky notes and the Know/Want to Know/Learned method. Pupils were encouraged to formulate objectives concerning classroom learning activities, as well as social and behavioural actions.

During this stage, the proposed methods were used alternately on different days. On other occasions, objectives were formulated verbally during morning discussions, recorded individually on sheets of paper or in notebooks using visual formats such as helium balloons or drawings, or formulated and presented orally to a deskmate as part of a paired activity. This component of the intervention programme drew on the role of critical thinking in analysing the learning situation, setting objectives, and reflecting on individual progress. The formulation of objectives also stimulated inductive and deductive reasoning, as well as hypothesis generation.

2. **Application and Development.** This stage corresponded to the implementation of regular teaching–learning activities and represented the central component of the FAIR programme. Depending on the nature of the content, teaching methods were integrated to stimulate critical analysis, argumentation, comparison of alternatives, formulation and testing of hypotheses, and inductive and deductive reasoning.

The programme promoted the flexible and frequent use of these methods, accompanied by a variety of learning activities, in order to create a consistently favourable educational environment for the development of critical thinking and to prevent instructional routine. The methods used during this phase were starbursting, the Venn diagram, the double-entry journal, concept mapping, brainstorming, the Six Thinking Hats, and debate.

3. **Identification of Errors.** The identification and analysis of errors represented an important component of the intervention programme, contributing to the development

of both critical thinking and self-assessment skills. Errors were approached as learning opportunities through reflection on their causes, the identification of knowledge gaps, and the establishment of appropriate remedial strategies.

This stage stimulated metacognitive processes and self-regulation by involving pupils in assessment, peer-assessment, and self-assessment activities, depending on the nature of the tasks being conducted. The teaching methods selected for this phase were PMI, RAI, and starbursting.

4. **Reflection of the Day.** The final stage of the intervention programme involved analysing the activities and behaviours displayed throughout the day and expressing a concluding reflection in the form of a drawing, an emoticon, a word, a sentence, or a short text.

Reflection of the Day incorporated elements of critical thinking through the analysis of what had been learned, the identification of difficulties, awareness of progress, and the interpretation of events experienced during the day. It also included aspects of self-assessment through reflection on individual performance, the identification of strengths and weaknesses, and the formulation of strategies for improvement. The teaching methods used during this phase were sticky notes and PMI.

The stages of the research are presented in Section III.9. The first stage consisted of diagnostic research conducted through a focus group. The focus group explored pupils' principal needs concerning critical thinking, the actual extent to which methods for developing critical thinking were used in the classroom, the effects of these methods on pupils' thinking, pupils' engagement in such activities, and the extent to which self-assessment techniques were employed by the teachers involved in the research.

The questions asked during the interview were as follows:

- What do you consider to be pupils' main needs regarding critical thinking?
- Which teaching methods do you consider effective in developing critical thinking?
- How frequently do you use these methods within the instructional and educational process?
- What prevents these methods from being used more frequently across different school subjects?
- When using these methods, what level of pupil engagement do you observe?
- What types of questions do you use to maintain pupils' attention?
- How do you use self-assessment in your teaching practice, and what effects do you observe among pupils?

- How do pupils respond when confronted with problem situations, both in everyday life and in situations specifically designed for educational purposes?
- What possible approaches may be used to assess critical thinking?

Different approaches to the assessment of critical thinking were also discussed during the focus group.

The experimental stage consisted of implementing the FAIR intervention programme described above. The doctoral thesis presents examples of activities specific to each phase of the programme.

The post-experimental stage aimed to assess the effects of the intervention programme on the variables under investigation. During this stage, pupils underwent a final assessment through the re-administration of the research instruments in order to determine the levels of critical thinking and self-assessment skills achieved following the intervention.

In conclusion, the third chapter of the doctoral thesis was devoted to presenting the empirical research, while the final chapter focuses on the analysis and interpretation of the results obtained from the experiment.

CHAPTER IV. PRESENTATION AND INTERPRETATION OF THE RESEARCH RESULTS

This chapter presents and interprets the results obtained following the implementation of the intervention programme in order to examine its effects on the variables under investigation. The data analysis aimed to test the formulated hypotheses and identify the changes recorded in critical thinking, self-assessment skills, and academic performance. Each of these three components was analysed and interpreted in a separate section. The chapter concludes with the presentation of the conclusions and the discussion of the doctoral research findings.

The data were analysed using JASP software, version 0.96, and the resulting findings were interpreted and presented.

The investigated sample consisted of children aged between 10 and 11 years. The distribution of the analysed sample may be considered homogeneous in terms of both the number of participants and their age. The control group comprised 42 pupils (49%), while the experimental group consisted of 43 pupils (51%).

Section IV.3 presents the analysis of critical thinking. Critical thinking was analysed by examining the five components assessed by the Cornell Critical Thinking Test: induction, deduction, observation, credibility assessment, and hypothesis formulation. To test the research hypothesis, a comparative analysis of the experimental and control groups was conducted using the scores obtained in the final assessment of critical thinking.

The descriptive analysis of the results revealed relevant differences between the experimental and control groups in terms of their levels of critical thinking at the final assessment. The mean scores indicated substantially higher performance in the experimental group ($M = 14.38$, $SD = 4.527$) than in the control group ($M = 6.862$, $SD = 3.906$), suggesting a higher level of critical thinking skills among the pupils who participated in the intervention programme.

The results obtained from the assessment of critical thinking during the pre-experimental stage did not indicate statistically significant differences between the experimental and control groups in terms of their initial levels of critical thinking ($p > .05$) across any of the critical thinking dimensions examined. This result supports the assumption of the initial equivalence of the groups and allows the differences subsequently identified to be assigned to the implemented intervention.

The comparative analysis of the initial and final scores recorded by the control group revealed no significant improvement in critical thinking, a finding that further supports the positive impact of the intervention programme. The results indicate that the exclusive use of traditional teaching methods, in the absence of an environment that actively stimulates critical thinking, does not support the development of this competence and may even lead to a decline in certain cognitive dimensions.

The comparative analysis of the experimental group's initial and final scores revealed a significant improvement in all components of critical thinking: induction increased from 11.51 to 18.02, deduction from 7.80 to 15.51, observation from 9.20 to 15.42, credibility assessment from 9.20 to 15.09, and hypothesis formulation from 2.60 to 7.80.

The comparison of the final results obtained by the experimental and control groups revealed statistically significant differences in favour of the experimental group. The Mann–Whitney test indicated a significant difference ($U = 5304$, $p < .001$), with a very large effect size (Cohen's $d = 1.79$). These findings were also confirmed by the independent-samples t-test ($t = -3.584$, $p < .001$), which produced a similar effect size (Cohen's $d = 1.78$, 95% CI [1.27, 2.28]), thus demonstrating the practical significance of the identified differences.

The results support the research hypothesis by demonstrating statistically significant differences between the experimental and control groups at the final assessment ($U = 5304$, $p < .001$), in favour of the experimental group. Furthermore, the independent-samples t-test confirmed these differences ($t = -3.584$, $p < .001$), indicating the consistency of the findings.

Section IV.4 presents the analysis of self-assessment skills. Pupils' self-assessment skills were analysed according to the type of self-assessment demonstrated (realistic self-assessment, underestimation, or overestimation) using statistical methods appropriate for categorical variables, namely the chi-square test. An intermediate analysis was also conducted after the administration of the first five self-assessment grids.

The descriptive analysis revealed different developmental patterns in self-assessment skills between the experimental and control groups. In the experimental group, this competence improved progressively, as demonstrated by an increase in the number of pupils who evaluated their performance realistically and by a decrease in tendencies towards underestimation and overestimation.

The analysis of self-assessment skills indicated that, during the initial stage, most pupils in both groups experienced difficulties in accurately evaluating their own performance, with underestimation and overestimation occurring frequently. The proportion of pupils demonstrating realistic self-assessment was relatively low in both the control group (27.4%)

and the experimental group (23.3%), suggesting a low level of metacognitive competence at the beginning of the research. The comparison of the two groups during the initial stage revealed no statistically significant differences in self-assessment skills ($\chi^2 = 0.438$, $p = .803$), thereby supporting the assumption of their initial equivalence.

The analysis of the development of self-assessment skills within the control group revealed no statistically significant changes between the initial and final assessments ($\chi^2 = 0.105$, $p = .949$). The results indicated that the distribution of the different types of self-assessment remained relatively similar at the two assessment points. The chi-square test showed that the observed differences could be attributed to random variation and were not statistically significant.

Within the experimental group, the comparative analysis indicated a significant improvement in self-assessment skills as early as the intermediate stage ($\chi^2 = 14.09$, $p < .001$), demonstrating the initial effect of the intervention programme on pupils' self-assessment behaviours. The proportion of pupils who assessed their performance realistically increased from 23% to 48%, indicating the development of self-assessment skills. The differences between the initial and intermediate assessments were analysed using the chi-square test, which revealed a significant improvement compared with the initial assessment and highlighted the influence of critical thinking on the manner in which pupils evaluated their own performance.

The development of self-assessment skills within the experimental group continued through to the final assessment stage, when the differences became even more pronounced ($\chi^2 = 35.82$, $p < .001$). The proportion of pupils who demonstrated realistic self-assessment reached 67%, reflecting significant and sustained progress in the development of metacognitive competencies.

The progress achieved by the time of the final assessment suggests that the effects of the intervention were cumulative and were progressively consolidated throughout the implementation of the programme.

The comparison of the final results revealed statistically significant differences between the two groups in terms of self-assessment skills ($\chi^2 = 32.12$, $p < .001$). In the experimental group, 67% of pupils demonstrated realistic self-assessment, compared with 26% in the control group, while tendencies towards overestimation and underestimation were considerably reduced. The effect size (Cramér's $V = 0.43$) indicates that the intervention programme had a moderate-to-large impact on the development of self-assessment skills.

At the final assessment stage, the results indicated a statistically significant effect of the experimental intervention ($p < .001$). The statistical findings support the research hypothesis,

revealing significant differences both in the development of the experimental group over time and in the comparison between the experimental and control groups.

Section IV.5 presents the analysis of the National Assessment results. The results obtained by pupils in both groups in the Grade 4 National Assessment were analysed, with the scores recorded for Romanian Language and Literature and Mathematics. Since the data distribution did not meet the assumption of normality, as verified using the Shapiro–Wilk test, differences between the groups were analysed using the Mann–Whitney test, which is appropriate for comparing two independent samples.

The descriptive analysis of the National Assessment results indicated slightly higher mean scores in the experimental group than in the control group in both Romanian Language and Literature ($M = 24.09$ versus 23.62) and Mathematics ($M = 16.95$ versus 15.98). Nevertheless, the identified differences were small, and the variability of the scores remained relatively similar across the two groups.

The statistical analysis revealed no statistically significant differences between the experimental and control groups in terms of academic performance, either in Romanian Language and Literature ($U = 873$, $p = .795$) or in Mathematics ($U = 803$, $p = .380$).

These findings suggest that the educational intervention did not produce significant immediate effects on the academic performance assessed at the end of the study, as the differences between the groups were not statistically significant.

Although the experimental group obtained slightly higher mean scores, the differences compared with the control group were not statistically significant. This indicates that the educational intervention did not have an immediate effect on academic performance as measured by the results obtained in the National Assessment.

The findings therefore did not support the research hypothesis, as the statistical analysis revealed no significant differences between the experimental and control groups in academic performance in either subject.

Sections IV.6 and IV.7 present the discussion and limitations of the empirical research.

The results demonstrate the effectiveness of the FAIR programme in developing critical thinking among pupils in the experimental group. The comparative analysis of the two groups and the effect size obtained confirm that the intervention produced significant improvements with both statistical and educational relevance.

The research findings indicate that a structured educational approach centred on analysis, reflection, and argumentation contributes to the development of critical thinking and the improvement of self-assessment skills. Although progress in critical thinking was more

pronounced than progress in self-assessment, both competencies showed significant development and were interdependent, being supported by higher-order cognitive processes such as analysis, reflection, monitoring, and the evaluation of one's own learning.

Although no statistically significant differences were identified in academic performance, this finding does not invalidate the effectiveness of the intervention programme. The result may be explained by the complexity of academic performance, which is influenced by numerous factors, as well as by the fact that the effects of developing critical thinking and self-assessment skills generally emerge gradually. Consequently, observable changes in academic performance may require the implementation of educational interventions over a longer period.

Several challenges and research limitations emerged during the development and implementation of the intervention programme:

- Identifying teachers willing to implement the FAIR intervention programme.
- Integrating the programme into regular teaching activities.
- Selecting the participant sample.
- The complexity of some of the proposed teaching methods.
- The level of teacher involvement.
- The use of a relatively low-complexity self-assessment grid.

In conclusion, the findings indicate an interdependent relationship between critical thinking and self-assessment skills, suggesting that the development of critical thinking also contributes to increased awareness of one's own performance. These findings support the need for an integrated educational approach aimed at developing both cognitive and metacognitive competencies. The FAIR intervention programme proved effective in developing critical thinking and self-assessment skills; however, the findings concerning academic performance indicate that the intervention should be implemented over a longer period in order to produce measurable effects in this area.

GENERAL CONCLUSIONS

The research examined the influence of critical thinking methods on the development of primary school pupils, focusing both on the enhancement of cognitive competencies and on the formation of autonomous learning. The findings highlight the close relationship between critical thinking and metacognition and emphasise the central role of self-assessment in raising awareness of individual progress and developing intellectual autonomy.

Although self-assessment skills improved over a relatively short period, the development of critical thinking requires continuous practice and systematic integration into teaching activities. At the same time, the absence of immediate effects on academic performance reflects the complexity of this variable and suggests that the impact of critical thinking and self-assessment develops gradually, becoming more visible following long-term educational interventions.

The research also emphasises the need for a consistent and sustained instructional approach in which critical thinking is continuously supported. Isolated interventions may limit development, whereas an ongoing approach based on appropriate teaching methods, effective questioning, self-reflection, and the provision of a suitable learning environment can support the continuous development of these competencies.

In conclusion, the findings of this doctoral thesis demonstrate that the use of critical thinking methods in primary education contributes significantly to pupils' development at cognitive and metacognitive levels, as well as to the formation of a balanced self-image. By promoting reflection, self-assessment, and active engagement, these methods create favourable conditions for the development of autonomous pupils who are aware of and actively involved in their own learning process.

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