"ION CREANGĂ" STATE PEDAGOGICAL UNIVERSITY FROM CHISINAU

With manuscript title
CZU: 37.091:911(043.2)=111

DUMITRAȘCU DOINA-MARIA

DEVELOPING RESEARCH/INVESTIGATIVE COMPETENCE IN GEOGRAPHY IN THE HIGH SCHOOL CYCLE

532.02. School Didactics on Education Levels and Subjects

(Geography)

Summary of the PhD Thesis in Education Sciences

Chișinău, 2025

The thesis was developed within the "Education Sciences" Doctoral School, "Ion Creangă" State Pedagogical University of Chișinău, Republic of Moldova.

Composition of the Commission for the Public Defense of the Doctoral Thesis:

President of the commission:
COROPCEANU Eduard, PhD in Chemistry, full professor, ”Ion Creangă” State Pedagogical University of Chișinău, Republic of Moldova

Scientific Advisor:
Bocancea Viorel, PhD in Pedagogy, Associate Professor, ”Ion Creangă” State Pedagogical University of Chișinău, Republic of Moldova

Official Reviewers:
CABAC Valeriu, PhD in Physical and Mathematical Sciences, full professor, ”Alecu Russo” State University of Bălți, Republic of Moldova
FRANȚUZAN Ludmila, PhD in Pedagogy, associate professor and Researcher Republican Center for Psychopedagogical Assistance, Chișinău, Republic of Moldova
SOCHIRCĂ Elena, PhD in Geography, associate Professor, ”Ion Creangă” State Pedagogical University of Chișinău, Republic of Moldova
VOLONTIR Nina, PhD in Geography, associate professor, ”Ion Creangă” State Pedagogical University of Chișinău, Republic of Moldova

The defense will take place on June 25, 2025, at 2:00 PM, during the Committee for the Public Defense of the Doctoral Thesis, within the “Ion Creangă” State Pedagogical University in Chișinău, Senate Hall, Ion Creangă str., 1, block 2, MD - 2069, Republic of Moldova.

The PhD thesis and the abstract can be consulted at the Scientific Library of the ”Ion Creangă” State Pedagogical University in Chișinău (www.upsc.md) and on the website of ANACEC (www.cnaa.md). The abstract was sent on May 23, 2025.

President of the Public Defense Commission:
COROPCEANU Eduard, Full Professor, PhD in Chemistry _____

Scientific Advisor:
BOCANCEAViorel, PhD in Pedagogy, associate professor _____

Author:
DUMITRAȘCU Doina-Maria _____

TABLE OF CONTENTS

CONCEPTUAL BENCHMARKS OF THE RESEARCH

The relevance and significance of the research topic stem from the imperative to align education with contemporary learning paradigms, new curricular orientations and the challenges faced by a society marked by the exponential advancement of technology, information, and science.

The development of research/investigative competence (CCI) within Geography teaching is justified through several dimensions: the geographical dimension, by analyzing major global issues and the interactions between natural and anthropogenic components of the environment; the transdisciplinary dimension, by capitalizing on Geography's compatibility with integrated approaches to knowledge; the lifelong learning dimension, through methodologies adapted to continuous learning; the gnoseological dimension, reflecting the integrated nature of geographical reality.

The Freinetian concept of *living geographically* supports an active, experiential, and conscious engagement with surrounding reality throughout life, integrating educational activities into a continuous and effective learning process.

While other high-performing education systems across Europe, Asia, North America and Latin America have already integrated the development of key science competencies into the Geography curriculum, Romania still lacks such integration at the high school level. This gap affects the coherence and effectiveness of the process of developing Geography-specific competencies.

This situation underscores the urgency and necessity of the topic, aiming to propose solutions for curricular updates in line with European and international trends. Therefore, the importance of developing key science competencies within Geography - as scientific knowledge, investigative skills, and a positive attitude toward science - is essential not only for future specialists and researchers but also for citizens engaged in community-based research projects, such as citizen inquiry initiatives.

The research level of the thesis is defined by several key directions that theoretically and methodologically underpin the concept of Competencies: educational theory, through the approach to school competencies as outcomes of the educational system - Cristea S. [3], Vlădescu I., Neacșu I. [10], Bontaș I., Nicola I. [11], Cucoș C.; curriculum theory and methodology - Bruner J., Ciolan L., Borzea E. A.; teaching methods - Cerghit I.; theory of educational situations- Ionel V., Iucu R., Ștefan M. [15]; inquiry-based learning models [24] - Kaser S.S., Halbert J.; cognitive psychology and neuroscience - Joița E. [7], Sălăvăstru D., Negovan V., Piaget J.; developmental psychology- Verza E., Verza F., Neacșu I.; psychology of cognitive mechanisms - Zlate M. [18], Miclea M. [9]; development of scientific thinking- Sănduleac S. [12]; development of strategic thinking - Brătianu C.; metacognition - Joița E., Jinga I., Negreț I., Fluieraș V.; epistemic cognition - Frumos F.

In the field of Didactics of Geography, relevant contributions come from: Schoumaker M., Drumea P., Drumea S., Dulamă E. [4], Mândruț O., Dan S., Ilinca N. The global definition of school competence is provided by: Tardif J., Cardinet J., Meirieu Ph., De Ketele J.M., Roegiers X., Scallon G., Jonnaert Ph., Schön D.A., Zarifian Ph., Le Boterf G., Maciotra D. [23], Decroly E., Dewey J., Scriven M., Freinet C., Claparede O.

In Romania and the Republic of Moldova, significant contributions are made by: Ionescu M., Radu I.T. [6], Potolea D., Dulamă E., Mândruț O. [8], Neacșu I., Golu P., Manolescu M., Hadîrcă M., Guțu V. [22], Cabac V. [20], Radu I.T. [6], Stoica A. [14].

The formative aspects of KSC have been studied by: Sclifos L. [13], Teleman A. [16], Botgros I. and Frănțuzan L. [5].

The normative framework of the research is ensured by international, Romanian, and Moldovan educational policy documents: [25], [26], [27], [28], [30], [31].

The research aim lies in identifying the theoretical and methodological foundations for developing CCI, with the aim of designing a pedagogical model for the development of research/inquiry competence in Geography at the high school level, as well as the corresponding methodology, validated through pedagogical experimentation.

The **research objectives** include:

1. developmentof a conceptual framework for the development of CCI as a key educational outcome in high school Geography, through the clarification of fundamental concepts;
2. identificaion of the methodological benchmarks for CCI development based on the analysis of specialized literature, normative frameworks and pedagogical models for competence development;
3. conceptualisation of a pedagogical model for the development of research/investigative competence in Geography in the high school cycle (MPCCIDGCL) and the associated methodology;
4. validation of the effectiveness of the methodology of CCI (MDCCIDGCL) elaborated based on MPCCIDGCL, through pedagogical experimentation and statistical analysis of the results.

General hypothesis of the research: The development of the structural components of CCI (knowledge, skills and attitudes) will be effective and relevant within the context of high school Geography if it is grounded in the MPCCIDGCL and its associated methodology, designed in a systemic and flexible manner:

- theoretically and methodologically grounded in all aspects of the CCI development process;
- aligned with a curriculum framework that is thematically structured both intra and interdisciplinarily;

- modularly planned, according to the stages of the inquiry cycle;
- focused on the action-reflection dimension of formative activities;
- characterized by the implementation of a full investigative cycle and by the application of the geographical perspective.

The scientific research methodology systematizes: methods for clarifying epistemological aspects - scientific documentation, the inductive-deductive method, conceptual analysis, and hermeneutic synthesis for the deduction and interpretation of pedagogical paradigms and research findings; reasoning and argumentation; interpretative synthesis; methods for addressing theoretical issues: modeling, analytic-synthetic methods and comparative research methods; experimental investigation methods: pedagogical experiment, observation, conversation, questionnaires and evaluation tests; methods for analyzing and interpreting experimental data: measurement and statistical processing of research results.

The scientific novelty and originality of the research are evidenced by the development of Research/Investigative Competence as a subject-specific school competence within high school geography, through integrated content and a characteristic methodology (curriculum design based on learning lines, a geographical perspective and the use of cartographic supports), conceptualized as an adaptive power to solve real-life problems curricularized as meaningful learning situations and developed by students through the stages of an action-reflection-action cycle, in accordance with MPCCIDGCL and MDCCIDGCL.

The results contibue to solve a significant scientific research problem pertain to the conceptualization of the MPCCIDGCL and the experimental validation of the MDCCIDGCL, which has led to the effective formation of CCI components within the profile of the high school graduate.

The theoretical significance of the research lies in: the elaboration of a definitional framework for school competence as an aggregate of scientific knowledge, epistemic knowledge, skills, attitudes and values; the development of a taxonomy of pedagogical terms related to CCI; the description of formative elements of CCI as reflected in international geography curricula and in cognitive psychology and neuroscience (e.g. cognitive scenarios); the derivation of CCI from the current theoretical and normative educational framework; the conceptualization of the MPCCIDGCL through six frameworks; the modular and systemic design of the MDCCIDGCL with an integrated and inquiry-based approach to curricular content; the description of levels of CCI development (reproductive, productive-creative, innovative) in relation to cognitive abilities, types of thinking and types of knowledge involved; the criterion-based description of CCI components; the examples of task types, research projects and assessment tests; the drafting of conclusions and recommendations for future research directions.

The practical value of the research lies in the applicability of the

MDCCIDGCL to high school education and its high degree of adaptability to other educational contexts (different school subjects, cross-curricular approaches), educational levels and curricular content through: the description of CCI levels and the developmental levels of its components; the modular approach to designing CCI based on inquiry stages; the systemic approach to the instructional process of developing CCI; examples of tasks aligned with the inquiry stages; the development of a typology of geography-specific research projects; the use of cognitive scenarios to foster the development of knowledge, skills, attitudes, and values related to investigation throughout all stages of the inquiry process.

The implementation of scientific results: took place through the conduct and validation of pedagogical experimentation within "Ghorghe Cartianu" Technical College, Piatra Neamț, as well as through publishing and dissemination activities in scientific events.

Publications related to the thesis topic: 31 scientific papers. Articles in scientific journals from the Republic of Moldova (category B) - 3, publications at scientific events in the Republic of Moldova (included in the Registers of scientific events approved by ANACEC) - 4, publications at other events in the Republic of Moldova - 16, publications at other international events - 4.

THESIS CONTENT

Chapter 1: *Theoretical Foundations of the Development of School Competencies* systematically addresses the concepts of school competence, key science competencies and research/investigative competence within the Geography curriculum.

The concept of school competence is defined as an aggregate of disciplinary knowledge, epistemic knowledge, skills, and attitudes, engaged in an integrated situational context, derived from the curricular themes, and structured within a reflection-action-reflection cycle. This cycle develops the human personality cognitively, functionally and behaviorally. The definition captures the entirety, contingency and dynamic nature of competence, anchoring it to the goals of education as the final purpose of the system.

The semantic and methodological delimitations and clarifications of terms such as investigation, research, inquiry, scientific inquiry and scientific investigation are discussed in relation to various activity environments and educational systems. Constructing a historical-evolutionary perspective on the terms in question highlights the characteristics of the structural, functional and operational components of CCI, as well as its teleological value.

School competence is described as an adaptive power in new situations, allowing the transition from being a curricular-modelled competence to an active competence in real-life situations. Various aspects and forms of the educational situation, significant learning situations, and integration situations that favor the

development of school competencies are argued. The didactic transposition of the transfer of expert knowledge into school knowledge, and of functional knowledge within competencies, is approached through the lens of cognitive psychology of intellectual mechanisms that enhance the process of transferring and mobilizing knowledge in new situations. Formative assessment of knowledge, skills and attitudes is undeniably linked to the inseparable nature and developmental levels of competencies. The constructivist paradigm reorients the evaluation from the quality versus quantity of knowledge and emphasizes the importance of integrated situations in the manifestation of school competencies.

The graphic representation of the taxonomy of pedagogical terms within the scope of defining CCI (Figure 1.1), depending on the level of schooling, the type of action, and the specificity of the cognitive operations and structures involved in learning, reveals an expansion of the scientific horizon at the academic stage of scientific discovery, specific to researchers and scientists, from exploration to investigation and research within the school environment, practiced consecutively within the cycles of schooling. The scientific horizon, a term we use to describe the current level of development, knowledge and exploration in a specific scientific field, reflects the idea that science is a continuous process of exploration and discovery. The scientific horizon is not static. It expands as new questions are posed and new answers are found as a result of ongoing investigations and innovations within the scientific community.

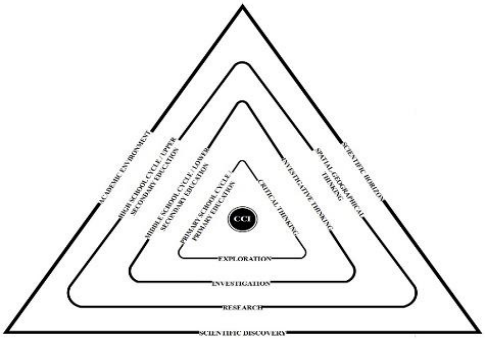

Figure 1.1. Taxonomy of Pedagogical Terms in the Definitional Domain of Investigative Competence (CCI)

Chapter 2. The Methodological Benchmarks for Developing Research/Investigative Competence (CCI) in High School Cycle were elaborated following a study of pedagogical models for developing school competencies as described in the specialized literature (Section 2.1). These models include action-based approaches, integrated approaches, reflection-in-

action and reflection-on-action strategies, stages of investigation and the specific characteristics of geographical inquiry. They contributed to a deeper understanding of the addressed concepts. Their visual, statistical-mathematical, or analogical structuring had both descriptive-explanatory and formative value for the CCI competency units, which were significant for our research for three main reasons: domain of interest: school competencies, science competencies, competencies specific to Geography and investigative competence supported the taxonomical derivation of CCI at the curricular level; competence units: geographical-spatial thinking, reflective thinking, and the application of multiperspective approaches in geographical inquiry guided the design of the pedagogical model; instructional strategies aimed to increase the efficiency of the development process for knowledge, skills and research/investigative attitudes, helped define a methodological framework specific to CCI.

The **pedagogical model** (**MPCCIDGL**) is presented in Section 2.2, (Figure 2.1). It integrates six frameworks that organize the development of CCI: the theoretical foundation framework of CCI, the curricular normativity framework, the psycho-socio-pedagogical framework specific to adolescents, the action-oriented framework, the reflective framework and the framework corresponding to the high school graduate profile.

1. **The theoretical foundation framework**is established by paradigms, principle and learning theories that shape the distinctive features of the model. In developing the model, we adhered to: philosophical, sociological and psychological axioms that configure reasearch/investigative competence as a school-based competence, corresponding to the aims of the educational system, regulated by the quality of social development as embodied in the high school graduate's profile; the gnoseological law regarding the scientific content and its degree of internalization, organized according to general pedagogical and subject-specific didactic laws, aimed at optimizing learning as a developmental process of CCI, specifically across its planning-development-evaluation components; the law of educational system organization, characterized by efficiency, effectiveness and progress in formal curricular education; pedagogical principles, subject-specific principles of Geography and principles inherent to investigation as a scientific research method.

The theoretical foundation of the model was constructed based on a progressive theory of knowledge building, moving from educational praxis as defined by the socioconstructivist micro-paradigm, to ontological, action-based, methodological, and epistemological approaches, culminating in a competency-based curriculum macro-paradigm that systematizes pedagogical discourse.

2. **The curricular normativity framework** for the development of CCI refers to the design of the **MPCCIDGCL** based on three key principles that regulate educational practice and guide the teaching-learning-assessment process, ensuring its efficiency through their strategic and operational value.

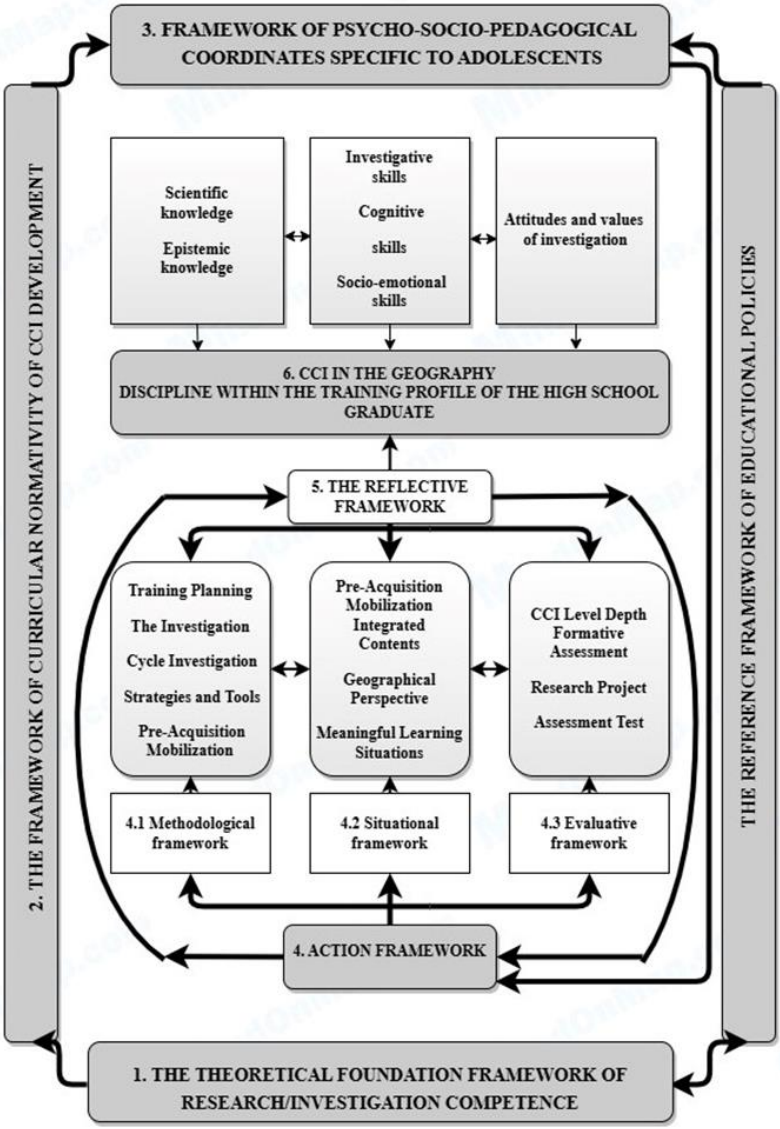

Figure 2.1. Pedagogical Model for Developing Research/Investigative Competence in Geography in the High School Cycle

3. **The framework of psycho-socio-pedagogical coordinates specific to adolescence** can be leveraged in geographical investigation from the perspectives of neuroscience, constructivism, genetic processes, moral development and vocational orientation. Ontogenetically, during adolescence, formal intelligence and the structures of formal logical thinking, which begin in preadolescence, become consolidated at the intellectual and cognitive levels. Nicola I. [68, p. 133] refers to this period as the age of abstract systems and theories, the age of flexibility in hypothetical-deductive reasoning between the real and the possible, which supports a growing interest in scientific discovery and the formulation of constructive abstractions.

4. **The action-oriented framework of the MPCCIDGCL** is bidirectionally linked with the reflective framework. According to the Triple Logic Paradigm [22], proposed by researcher Guțu V., the process of developing CCI is structured across three distinct levels: the situational framework, the methodological framework and the evaluative framework, all embedded in a cyclical context of reflection-action-reflection.

5. The **situational framework**is designed around meaningful learning situations derived from a problem-based and integrated approach to curricular content. These are developed as intradisciplinary thematic references (e.g. the anthropogenic impact on environmental components).

6. The **methodological framework** is characterized by the modular planning of the stages in the investigative cycle. Thus, MPCCIDGCL aligns with the psychomathetic modular teaching model, situated within the realm of integrated learning.

Frameworks 4 and 5 - the action-oriented and the reflective - generate concrete transformations in the development of CCI components, which are articulated as system outputs in Framework 6. When examining the nodal points of the model, three elements specific to the discipline of Geography emerge as central to the construction of knowledge: the geographical perspective, the types of thinking involved and the investigative cycle.

According to Zlate M., **scientific thinking**, depending on the domain in which it is applied, is considered *thinking in action* [18, p. 86], as the student becomes consciously involved in problem-solving by engaging in the stages of the investigative cycle and selecting a geographical research perspective. Scientific thinking evolves into heuristic thinking due to its multiphase and multidimensional nature [10, pp. 44 - 45], shaped by the cognitive architecture required by the specific characteristics of each stage in the investigative cycle.

Spatial thinking is the type of thinking that utilizes the qualities of space as a tool to structure problems, identify answers and articulate solutions, being intrinsic to the subject matter of the geosciences.

The Investigative Cycle (CI) is conceived as a cognitive scenario, as described in cognitive psychology “a special cognitive schema,” “a typical

sequence of events corresponding to a specific context" [7, pp. 215 - 254], which aligns with a sequence of structured, stage-based investigative activities. These include: identifying and formulating the research topic, designing the research plan and appropriate methodology, conducting the investigation itself and formulating and presenting the findings.Within the proposed model, these stages are approached cyclically, as the investigator may choose to continue the inquiry, revisit earlier stages of the investigative cycle and revise certain aspects of the research.

The geographical perspective is determined by the specific nature of the research problem as well as the goals and objectives of the investigation. This perspective may involve spatial, evolutionary or scalar approaches to the phenomena under study. Geography, as a spatial science, adopts a systemic approach to analyzing elements and the relationships established among them.

The evaluative framework of CCI focuses on assessing the outcomes of student-conducted investigations in terms of the depth of development of CCI competency units, based on criteria-based descriptors, as a measure of the extent to which educational objectives have been achieved. This framework consists of evaluation forms and tools that enhance the efficiency of CCI development.

The reflective framework is expressed through the conscious experience of activity within each stage of the investigative cycle.

6. **The framework of CCI components**, as represented in the PFAL model [31], includes knowledge, skills, attitudes and investigative values, which operate synergistically within the educational process.

2.3. Methodology for Developing Research/Investigative Competence in Geography in the High School Cycle, developed on the basis of the pedagogical model (MPCCIDGCL) refers to the the structure of CCI, derived from the domains of key competences as defined by the European Council and the Education Code. These frameworks assign to scientific fields specific competences related to Geography, namely CCI, competency units, and content units.

The objectives of implementing the MDCCIDGCL model were to: ensure flexibility in developing CCI units by correlating the content units of the school curriculum with a problem-based thematic reference framework; implement modular planning of the stages of the investigative cycle and apply cognitive scenarios involving algorithmic analysis as investigation patterns that leverage the systemic nature of cognitive operations; tailor investigations to the subject of Geography by applying a geographical perspective of time, space and scale in relation to the environment; adopt a cyclical instructional approach to developing CCI components, following a reflection-action-reflection model; use didactic strategies aligned with the psycho-pedagogical development of high school students: scientific investigation, problematization, research projects and investigation supports; calibrate and diversify tasks through worksheets designed according to the stages of the investigative cycle; systematize the requirements for

different types of research projects; implement formative assessment through testing and summative assessment through the final research project.

The development of CCI in Geography at the high school level is represented in matrix (Figure 2.2), through the correspondence between cognitive capacities and types of thinking with the types of knowledge developed progressively throughout the investigation process. The criterial description of CCI levels in Geography outlines three levels of CCI, categorized by the depth of demonstrated knowledge-foundational, functional, internalized and externalized:

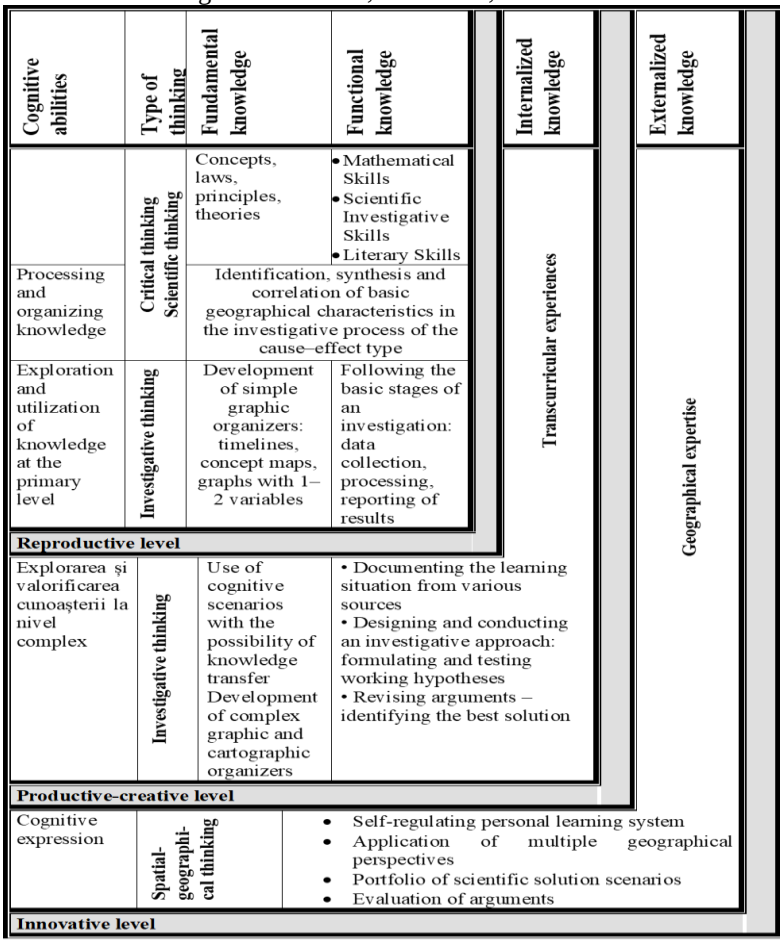

Figure 2.2. Matrix of the Development of CCI Components in Geography in the High School Cycle

level I - reproductive level: the student possesses all CCI components, enabling them

to carry out an investigative cycle based on a reference example; level II - productive-creative level, involves greater responsibility for the investigation. Knowledge becomes internalized and is expressed through personal interest in testing hypotheses, identifying geographical perspectives and determining optimal problem-solving scenarios; level III - innovative level requires innovation in investigation, emerging from the student's curiosity, motivation and passion, followed by civic engagement and culminating in operational expertise across all stages of the investigative cycle. Levels I and II are intrinsically embedded in Level III, as the demonstration of geographical expertise through spatial-geographical thinking presupposes prior development of scientific and investigative thinking. Similarly, the student's self-regulatory knowledge system develops through complex engagement with knowledge by completing all stages of the investigative cycle, employing cognitive scenarios and specific graphical and cartographic analysis tools. Exploration of knowledge at the primary, functional level involves the use of functional knowledge aligned with curricular content and the epistemic knowledge of CCI. The degree of knowledge integration into the learner's internal system serves as a comprehensive indicator of their CCI level, reflecting their ability to demonstrate knowledge, skills and attitudes at reproductive, creative or innovative levels.

The matrix for CCI development in Geography at the high school level is organized into learning progressions lines in accordance with the concept proposed by Lindner-Fally M. and Zwartjes L. [24], and aligned with cognitive organizers specific to the logic of investigative study of content units.The combinatorics of CCI component development levels, based on the cognitive domain (knowledge and understanding / application / integration), determines the overall CCI level attained by students (Table 2.1).

Table 2.1. Levels of Research/Investigative Competence

CCI Level	Development Level of CCI Components / Cognitive Domain		CCI Components
Reproductive	Low	- Knowledge and understanding - Application - Integration	Epistemic and geographical knowledge Investigative skills Attitudes and values
Productive-Creative	Medium		

The contents of the instructional strategy are utilized based on the matrix design of the CCI competency units which highlight their: scientific character, appropriate and specific to Geography competencies, reflecting the scientific domain of key competencies expressed in educational policy documents; taxonomic nature, in the formulation of competency units using geography-specific terminology in line with educational standards; systemic structure, showing the intradisciplinary interrelations of specific Geography competencies and thematically integrated content units; concentric (spiral) organization, of content units corresponding to the

studied subjects, focused on the alignment between the geographical perspective, cognitive level and the stages of the investigative cycle.

In accordance with the intended objectives, we consider that three categories of teaching strategies enhance the development of CCI during Geography lessons: cognitive strategies - aimed at deepening the understanding of the investigated issues and developing research algorithms for the geographical environment by practicing mental processes such as analysis, synthesis and evaluation of information; action-oriented strategies - focused on concrete action methods, involving practical activities that transform knowledge into applied skills, such as exercises, problem-solving, algorithmization, practical tasks, experiments, case studies and research projects; affective-attitudinal strategies - motivational in nature, influencing how students perceive, become aware of, react to, and engage in the learning process: they position themselves in the investigation, investigate and reflect on it.

Explanatory, conceptual, methodological and axiological interdisciplinary correlations (Figure 2.3), in the systemic approach to the development of CCI focus not on disciplinary content, but on the intellectual, affective, and psychomotor capacities of the student**,** according to D'Hainaut L.

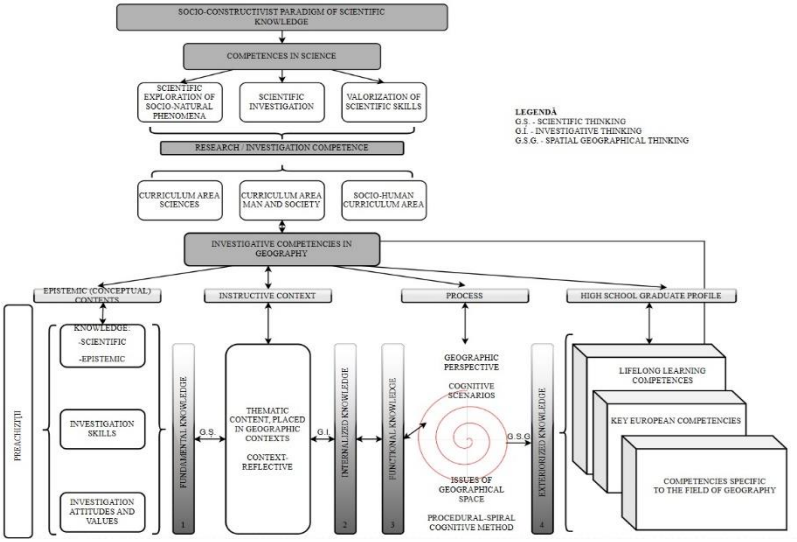

Figure 2.3. The Systemic Approach to CCI Development in Geography

The applicative framework of the methods employed is characterized by a series of specific instructional approaches: the approach to science teaching methodology as both a process and instruction based on action methods-learning through discovery, inquiry-based learning and investigative methods [26]; the predominance of action-oriented strategies within the procedural-operational model,

which entails “an authentic activity of systematic and progressive construction of students’ individual knowledge” [10, p. 89], continuously reorganizing the genetic and social cognitive operational structures; the use of operational schemes as fundamental tools of knowledge, facilitating transfer across classes of situations; incorporating cognitive and practical experiences that involve mental model structures, specific criteria and indicators. The formation of basic operators of understanding is characteristic of high school students’ age, described as “types of mental classifiers, as developers of coordinating models that allow the explanation of various complex phenomena” [10, pp. 144 - 145]; the perspective of lesson management conceived as a paideutic microsystem, according to Cerghit I., in which knowledge is stimulated by the optimal balance between the assimilation of teaching strategies and alignment with real-life conditions in which a learning situation can unfold; the thematic contextualization of intra - and interdisciplinary CCI, which involves a methodological approach expressed through the connection of learning situations to their social context.

The structuring of the investigative cycle stages within the framework of a cognitive scenario (Table 2.2), ensures a quasi-automatized investigative behavior [10, pp. 363 - 364].

Table 2.2. Stages of the Investigative Cycle and Cognitive Scenarios

Stage	Stages of the Investigative Cycle	Cognitive Scenarios
1	Formulating the research problem	Identify / Confront / Expand
2	Formulating the working hypothesis	A testable statement/assumption that responds to the research problem
3	Developing the investigation plan	3 stages / 3 actions / 3 results / 3 interpretations
4	Data collection	Reflect / Organize / Reflect
5	Measurement	Diagnosis / Prospecting / Forecasting
6	Representation of the problem space	Graphic organizers / Correlations / Reflection
7	Data processing	Purpose / Objectives / Prioritization
8	Data evaluation	Recall / Meaning-making / Reflect / Expand
9	Communicating investigation solutions	Scientific and geographic language / Visual elements / Key elements / Flexible solution elements

Chapter 3, titled **Experimental Validation of the Effectiveness of the Methodology for Developing Research/Investigative Competence** in High School Geography is structured into several parts. **The design of the pedagogical experiment** (Section 3.1), is described step by step, both in terms of structure and specific methodology, in accordance with the scientific foundation presented in the first two chapters. The research design was organized into four stages, each characterized by specific research goals and objectives:

- the pre-experimental stage includes: an initial diagnostic phase involving the assessment of the current state of research through analysis of pedagogical literature, thematic studies, curricular documents and the identification of geography teachers’ perspectives on the development of CCI; the subsequent development of specific evaluation tools, legitimizing the reconfiguration of pedagogical intervention forms; the pilot testing of the Methodology for Developing Research/Investigative Competence in High School Geography;
- the diagnostic stage aimed to determine students’ initial levels of knowledge

and investigative skills by administering a pre-assessment test. This test was developed based on a specification matrix that would later be used for the final assessment as well;

- the formative stage involved the implementation of instructional activities within the curricular framework, based on the developed methodology, with the objective of enhancing CCI competency units; the control stage or statistical-mathematical validation stage, focused on evaluating the experimental results to determine the effectiveness of the MDCCIDGCL.

The initial research assessment phase was carried out in accordance with the structure of the 2020 - 2021 academic year in Romania. It included a series of steps, the results of which would later serve as the methodological and scientific foundation for designing the pedagogical intervention program aimed at developing high school students' CCI in Geography. A needs analysis was conducted through data and information collection to understand the theoretical and practical-applicative issues surrounding CCI in the context of school practice, using a questionnaire administered in October 2020. The questionnaire, administered via Google Forms to 125 Geography teachers from Romania and the Republic of Moldova -16.6% teaching at the lower secondary level and 83.2% at the upper secondary level - had the following aims: to diagnose teachers' understanding of the structure of CCI, the geographical specificity of the CCI development process and of effective methodology for developing CCI, as exemplified through best practices; to identify restrictive aspects encountered during their initial and continuing professional training in relation to the instructional process of school competencies, including CCI; to collect methodological suggestions for pedagogical intervention derived from teachers' direct classroom experience.

Conceptually, the questionnaire was structured into three levels of investigation derived from the theoretical and methodological foundations of CCI: teleological aspects of CCI, exploring teachers' perspectives on fostering a spirit of inquiry in students and on the axiological dimension of research ethics and deontology; methodological aspects, focusing on teaching strategies for developing investigative skills within an investigative cycle, aiming to correlate these strategies with the specific nature of Geography and with students' psychopedagogical development level; cognitive mechanisms, addressing the development of scientific, investigative and spatial-geographic thinking.

The pilot implementation of the intervention program was carried out between November and June of the 2020 - 2021 academic year, involving 32 ninth-grade students studying General Physical Geography.

The purpose was to test the program's effectiveness and to adjust and optimize it methodologically, in line with scientific content requirements and students' psycho-pedagogical development levels, in preparation for subsequent large-scale implementation. The objectives of the pilot study included: engaging

students in discussions about the concept of CCI and its development as a school-based competence within the Geography curriculum; applying the custom-developed didactic methodology to a small sample, through three research projects organized using frontal, group, and individual activity formats; observing the depth of students' attitudes and values related to research during the implementation of research projects; conducting qualitative evaluation of the student-led projects; gathering end-of-year (2020 - 2021) student feedback on both favorable and limiting aspects encountered in the development of CCI through research projects.

During the diagnostic stage, the aim was to assess the level of development of students' investigative knowledge and skills across the entire sample involved in the pedagogical experiment. The proposed objectives were: selection of the Experimental Group (EG) and Control Group (CG), based on discussions with the teaching staff from class councils, focusing on students' motivation, learning pace and learning styles. The objectives were: to identify elements of homogeneity and equivalence between the groups, which were subsequently verified through statistical processing using the SPSS program; identification of research variables: Independent Variable (IV) - implementation of an intervention program for the development of CCI; Dependent Variable (DV) - represented by effects, expectations and academic outcomes, aiming to enhance the learning process of curricular geographic content and to develop the components of CCI. The dependent variable was operationalized through: DV1 - The ability to understand and apply scientific concepts, themes and research problems in the investigation of the geographic environment; DV2 - the ability to solve environmental problems using information represented in graphical and cartographic formats DV3: The ability to approach investigative elements spatially and integratively from various geographic perspectives, addressing the problem-solving aspects of the research theme; DV4 - the attitude demonstrated toward and within the scientific investigation of environmental issues; selection of specific curricular geography competencies and their correlation with the identified research variables; development and validation of evaluation instruments (initial and final assessment tests), a phase carried out according to the following design: determining test type characteristics, defining evaluation objectives, designing the specification matrix, constructing items, creating the scoring rubric, test administration, grading and results analysis; administration of the test to the entire research sample, along with the collection and interpretation of results.

The formative experiment (Section 3.2), was conducted as a practical-applied research project in the students' natural instructional environment, adhering to the structure of the 2021 - 2022 and 2022 - 2023 school years, in line with the scheduled Geography curriculum, which allocates one class period per week according to the national curriculum framework, and considering the real-life classroom conditions, including physical classroom settings and student class

composition. The experiment was carried out in a Romanian upper secondary educational institution: "Gheorghe Cartianu" Technical College in the city of Piatra-Neamț. The selected sample consisted of 166 students in the technological track, and the research followed a before-and-after design, to ensure objectivity and methodological rigor while minimizing experimental errors throughout all stages of the study. MDCCIDGCL was implemented only in the experimental group (EG), composed of 83 ninth-grade students from three different classes. The control group (CG), also composed of 83 ninth-grade students from three classes, was instructed using only traditional formative teaching methods. It is important to note that the ninth-grade students in the 2021 - 2022 academic year belonged to the first generation in Romania to have studied Geography at the lower secondary level under the new national curriculum, which includes CCI .Because the pedagogical experiment aimed to observe the comparative evolution of equivalent groups, the experimental design is intersubjective in nature.

The objectives pursued in the formative experiment, through the implementation of the CCI development methodology in Geography classes, focused on the following:

O_1 - developing knowledge of the specific elements and required stages of an investigative cycle or research project: Geographical topic - research theme - research problem -working hypothesis - investigation plan design - research methodology selection - forecasts/scenarios;

O_2 - achieving integrated understanding of geographic content knowledge and epistemic knowledge related to investigating the geographic environment;

O_3 - developing investigative skills corresponding to each stage of the investigative cycle through activities organized in frontal, group, and individual formats, in line with the MPCCIDGCL and MDCCIDGCL frameworks;

O_4 - cultivating attitudes and values specific to research, such as integrity, respect and openness toward authentic inquiry;

O_5 - developing spatial-geographic thinking through the application of a geographic perspective in investigative tasks.

The implementation of the formative experiment (Figure 3.1), was carried out exclusively with the experimental group (EG) and based on: curriculum content established by the current Romanian school programs; the frameworks defined by MPCCIDGCL and MDCCIDGCL; three stages, corresponding to three developmental levels of CCI, during which students conducted a total of six complete investigative cycles; an alternation between formative instructional activities (FIAs) and formative assessment activities (FAAs) as follows: FIA1 - FAA1 - FIA2 - FAA2 (sequential test 1) - FIA3 - FAA3 - FIA4 - FAA4 (sequential test 2) - FIA5 - FAA5 - FIA6 - FAA6; a variety of didactic strategies, educational resources, and instructional formats; the predominant use of an algorithmic-heuristic teaching strategy, along with inquiry-based learning, problematization, and problem-solving techniques.

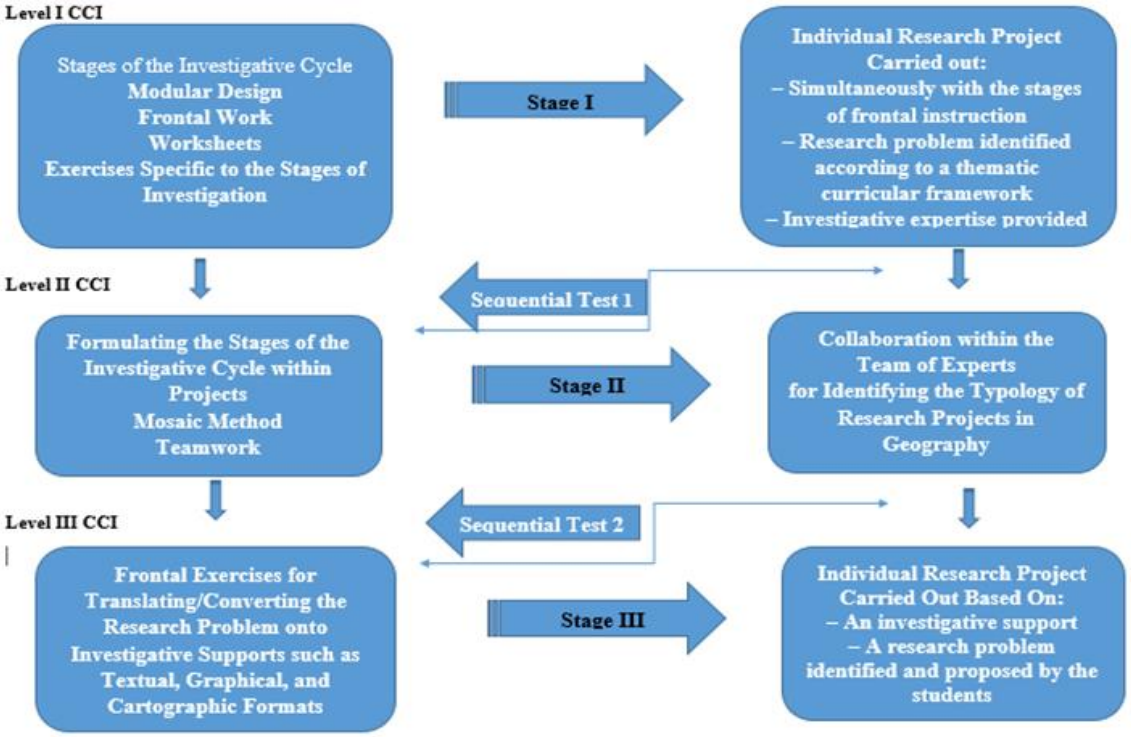

Figure 3.1. Stages of the Formative Experiment for Developing

3.3. Analysis and Interpretation of Research Results

Analysis and Interpretation of Findings from the Initial Diagnostic Phase

The teaching experience of educators, the accuracy of their observations during instructional activities and their knowledge of the students' psychopedagogical profiles helped identify and explain the difficulties students face when engaged in research projects and scientific investigations that involve following an investigative plan (Figure 3.2). Students encounter significant challenges across all stages of the investigative cycle: using techniques - 85%, electing the investigation plan - 79%, formulating working hypotheses - 78%, defining the purpose of the investigation - 73%, performing mathematical calculations - 42%. The causes of these difficulties are attributed to several factors: infrequent use of investigative approaches - 91%, teaching methods employed - 78%, lack of educational resources - 78%, low student interest in the Geography subject - 24%.

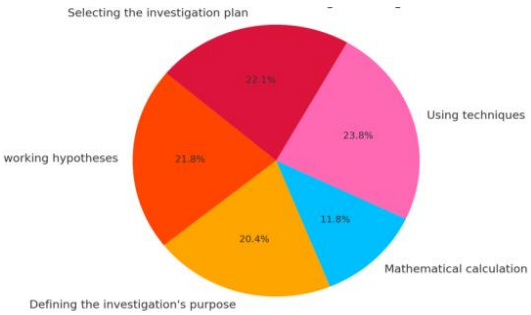

Figure 3.2. Students' Difficulties in Carrying Out the Stages of the Investigative Cycle in Geography

These results guided the research toward a problem-solving direction by developing a conceptual framework (MPCCIDGCL) and a methodological framework designed to structure teaching activities and instructional technology. The goal was to systematize the understanding of CCI within the Geography discipline, focusing on the efficiency of its teaching-learning-assessment process.

These results directed the research toward a problem-solving orientation by developing a conceptual framework (MPCCIDGCL) and a methodological framework aimed at structuring teaching activities and instructional technology, in order to systematize the understanding of CCI within the Geography curriculum in terms of both effectiveness and efficiency of the teaching-learning-assessment process

Analysis and Interpretation of Results from the Pilot Phase

During the pilot phase, the elaborated methodology based on the pedagogical model was implemented with an experimental group of 32 students. The implementation included CCI assessment instruments: initial, sequential and final tests, along with CCI level indicators and descriptors and an evaluation matrix. These

tools were subsequently revised, refined, and reorganized in terms of structure, content, and methodology to ensure alignment between the theoretical research and the realities of school practice.

Students' feedback was collected via a Google Forms questionnaire after completing three research projects associated with three investigative cycles. The questionnaire explored: students' motivation to engage in the projects, the importance of investigative tools during the investigative process, the perceived effectiveness of the investigative methods, and students' self-assessment of their level of CCI development.

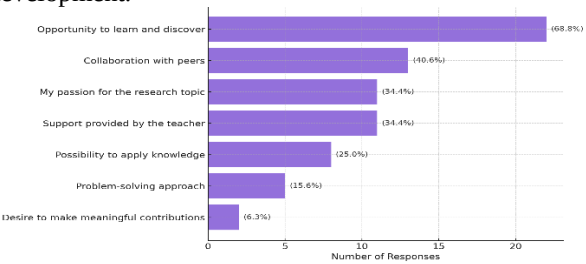

Figure 3.3. Students' Reasons for Participating in Research Projects

The pilot class students justified their active involvement in the research projects (Figura 3.3), through motivations such as: the opportunity to learn, interest and passion for the research topic and problem, the possibility to apply knowledge, the perspective used to approach the research issue and to a lesser extent, the desire to contribute innovatively. The teacher's support throughout all stages of the investigation and collaboration with peers remains a key motivating factor. The chart highlights students' responses regarding the elements involved in understanding, identifying and formulating the research problem. Each category reflects an essential pedagogical dimension for active learning, which is specific to geographic investigation. Discussions with peers and teachers (20 responses, category 5) showed the highest frequency, being acknowledged by 62.5% of respondents. This suggests that students view social interaction and communication as key to clarifying and deepening investigations.

Analysis and Interpretation of Results Obtained During the Diagnostic Stage (Pre-test)

The design of the statistical data analysis and the interpretation of the results of the pedagogical experiment were carried out using the SPSS statistical software. Descriptive analyses provided an overall perspective on the data, comparison of results between the experimental variables and the two groups (experimental and control) employed appropriate statistical methods, such as the independent samples t-test. Effect sizes were calculated to assess the magnitude of the observed differences. Visual interpretation was supported through the graphical representation of the results, facilitating clearer insights into the data.

In conclusion, we can state that the Experimental Group (EG) and the Control Group (CG) are relatively homogeneous, exhibiting similar distributions.

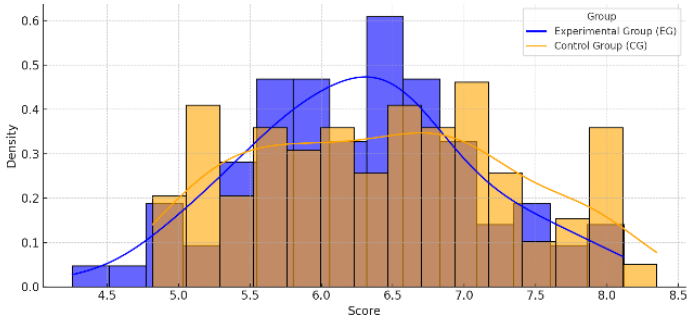

Figure 3.4. Histogram of the Density Curves for Initial Test Score Means – EG and CG

The homogeneity analysis of the two groups highlights that EG is relatively uniform, with values spread over a significantly narrower interval (approximately 5.0 - 7.5). The concentration around the value of 6.5 suggests a tendency toward cohesion in this range. CG shows a broader distribution, with consistent densities between 6.5 and 8.0, indicating a more uniform group compared to EG. The variable density, peaking around 6.5, may reflect differences in individual learning, suggesting that students in this group possess varying levels of competence-potentially resulting from differentiated learning processes or methodologies that have varying impacts depending on individual learning styles.

Comparison of initial test results between EG and CG across CCI development levels (Figure 3.5) reveals the following: compared to the means for VD1 (23.17 for EG and 23.30 for CG), the means for VD2 are significantly higher (21.77 for EG and 22.01 for CG). This may indicate a more demanding or less favorable educational context for performance and the general decline in practical skills warrants special attention; the greater dispersion in this new data set (VD2) - 4.35 for EG and 4.49 for CG - calls for more differentiated pedagogical strategies while maintaining coherence within the EG group. For VD3, the EG mean performance (17.23) reflects the group's overall response to task difficulty, necessitating level III - specific CCI development strategies. The standard deviation at this level shows a noticeable spread in results, interpreted as a lack of uniformity in the development of CCI.

The standard error of the mean - 0.52 for EG and 0.51 for CG - indicates adequate precision of the estimate for both groups. However, the increased variability in EG suggests the need for greater instructional control. VD3 data indicates an overall decline in performance compared to VD2, especially within the experimental group. Therefore, pedagogical interventions should aim to reduce variability and enhance overall performance.

From the analysis of the graphs (Figure 3.5, 3.6), several observations can be made: for the "Knowledge and Understanding" component in the Experimental Group (EG), the pre-test distribution is concentrated around lower values (15 - 20), suggesting moderate to low initial performance. The limited variability indicates uniformity at a low level of achievement. However, in the post-test stage, the distribution both broadens and clearly shifts to the right, with the highest frequency in the 20 - 25 range and including higher scores (up to 30). This reflects a clear improvement in performance. The intervention was effective, contributing to a general increase in the level of knowledge and understanding and reducing the initial gap with the Control Group (CG).

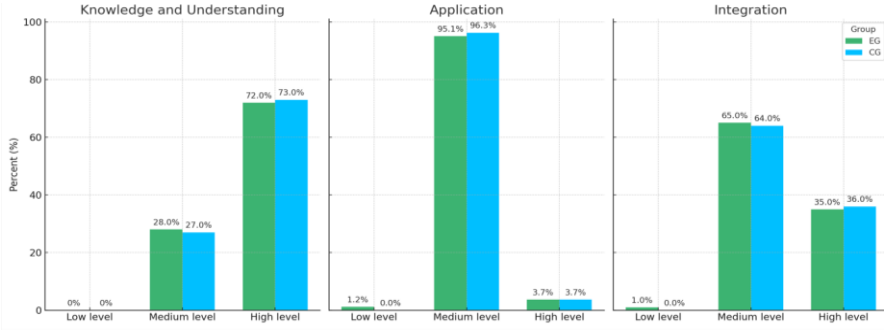

Figure 3.5. Comparison of Initial Test Results Between EG and CG by CCI Development Levels (% of Students)

Analysis and Interpretation of Results Obtained in the Control Stage (Post-test)

For the "Application" component in the EG pre-test stage, the distribution is tightly clustered in the lower range (10 - 15), indicating significant difficulties in this category prior to the intervention. In the Post-test, the distribution shifts rightward, with the highest frequency appearing around 18 - 22. Higher scores become more common, indicating an improvement in the ability to apply knowledge. While the intervention had a positive effect in this category, there is still room for further improvement, as the scores remain below those of the CG in the post-test.
For the "Integration" component in the EG pre-test, the distribution is concentrated in the lower intervals (1 - 15), and the low scores indicate difficulties in integrating theoretical knowledge with practical application and relating it to real-world problems. In the post-test, the distribution broadens and shifts to the right, with more frequent scores in the 18 - 25 range. There is a wider spread of results, with more high scores, indicating a significant improvement. However, the persistence of greater variability suggests that some students still face challenges in this area.

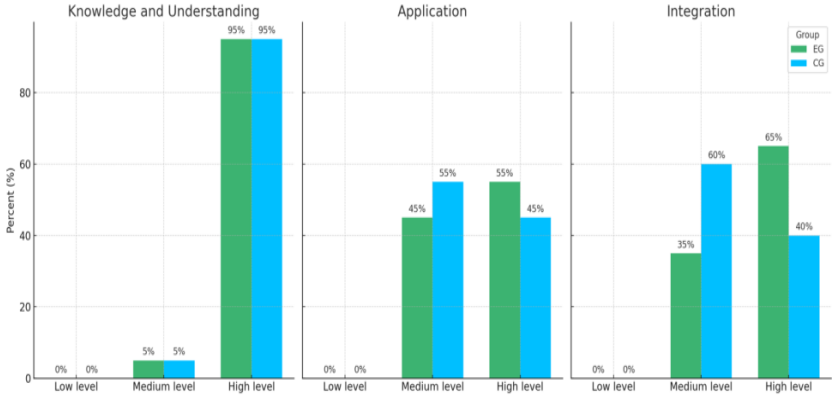

Figure 3.6. Comparison of Initial Test Results Between EG and CG by CCI Development Levels (% of Students)

The three types of statistical data processing descriptive, comparative, and longitudinal (evolutionary) confirm the research hypothesis, which, at the didactic and pedagogical level, lies in the development of the components of CCI. Students demonstrated procedural knowledge through their understanding and articulation of the following elements: the geographical theme, the research topic, the research problem, and the methodological sequence of a scientific investigation, as illustrated by the progression through the stages of an investigative cycle.

Investigative skills were validated through the conceptual resolution and mathematical calculation of problems related to the surrounding environment.

Attitudes characteristic of scientific inquiry resembling those of a scientist or researcher, were evidenced through adherence to investigative principles and ethical values, making it possible for students to construct evolutionary scenarios of the investigated phenomena.

The development of spatial-geographic thinking emerges as a consistent thread throughout the cognitive processes employed by students in their investigations. It is evident in the optimal integration of declarative, factual and procedural knowledge and implicitly in the expression of the skills and attitudes specific to investigation within the Geography curriculum.

The ability to know, apply knowledge in meaningful learning contexts and transfer it (reapply it), within a new investigative cycle, confirms the effectiveness of the Methodology for Developing Research/Competence in Geography in High School Cycle (MDCCIDGCL).

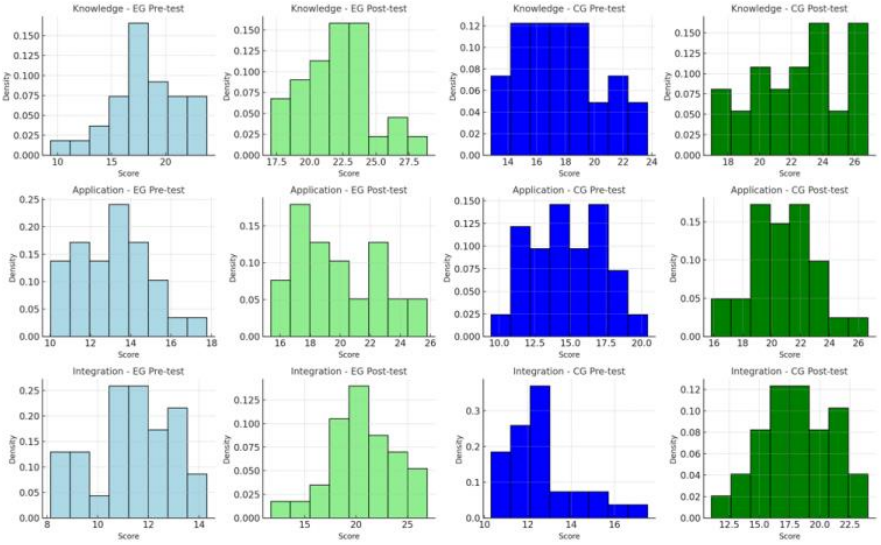

Figure 3.7. Score Distribution for CCI Components in Pre-test and Post-test for EG and CG

CONCLUSIONS AND RECOMMENDATIONS

The introduction of Research/Investigative Competence in Geography (CCI), into the high school curriculum in Romania and the Republic of Moldova, represents an innovative and contextually relevant initiative for today's educational landscape. This topic holds significant interest for both educational theorists and specialists, as well as for geography teachers, as it involves defining a theoretical and methodological framework aimed at facilitating students' transition from school-based learning environments to everyday social reality. Furthermore, the development of CCI targets educational policy-makers and curriculum developers, contributing to the adaptation of the school's educational offer to the dynamic demands of the labor market. The systemic and integrated development of CCI supports active citizen participation in community life and provides a solid foundation for lifelong personal and professional development.

The conclusions of the doctoral thesis synthesize the research findings and address the fulfillment of the research objectives:

- defining the concept of school competence (1.1), in terms of its structure and operational mechanisms, within a cycle of reflection-action-reflection and adopting a systemic approach to instructional situations and to principles and criteria for assessment, understood as a qualitative evaluation of the depth of students' acquired knowledge;
- presenting the theoretical and methodological benchmarks investigated and the

scientific concepts and interpretations of CCI (1.2), analyzed within a historical-evolutionary framework, allowed for the development of a taxonomy of pedagogical terms relevant to CCI. It also highlighted the importance of scientific inquiry in Geography classes and the successive stages of knowledge development within an investigative cycle from a geographical perspective (1.3). These findings led to the elaboration of a definitional framework for CCI. Based on the theoretical benchmarks from Chapter 1 and on both national and European regulatory frameworks in education, the significance of CCI as a sine qua non competence in school Geography was substantiated through the lens of action-oriented pedagogy. This competence is structured around knowledge, skills, attitudes and research values and is inextricably linked to spatial-geographic thinking as a distinctive feature in the Field of Learning Achievement Profiles (PFAL).

- the development of the Pedagogical Model for the Development of Research/Investigative Competence in Geography in High School (MPCCIDGCL) (2.2), was prompted by a comparative investigation of pedagogical models in the Life Sciences, Earth Sciences and Geography concerning CCI components (2.1). The model incorporates effective elements from cognitive psychology, epistemic cognition, developmental psychology, neuroscience, modern science educatio, and the didactics of Geography. The pedagogical conditions and normative aspects of geographic, didactic and investigative principles derived from current educational policies enabled flexibility in the operational component along three frameworks, through the combinatorial potential of teaching strategies, lesson organization formats and instructional tools adapted to the stages of the investigative cycle. The reflective component of the MPCCIDGCL is realized through the implementation of strategies and scenarios for the evolution of phenomena investigated by students.
- the didactic transposition of the MPCCIDGCL (2.3), required the comprehensive development of a specific methodology for fostering CCI in high school Geography. This involved deriving CCI from key competences, designing learning units along learning pathways and within the structure of geography as a school subject, modular planning of the investigative cycle stages and learning units based on an integrated thematic framework and providing examples of tasks for each stage of the investigative cycle along with levels of guidance for student inquiry. The teaching strategies leveraged scientific investigation and problem-solving methods related to environmental issues. The research project was methodologically constructed both as a process and as a product. As a methodological reference, its taxonomic systematization included criteria related to the research problem, types of hypotheses, research strategies, and problem-solving scenarios. The instructional-educational process was optimized systemically and integratively at the componential level (teaching-learning-assessment stages) and structurally at the level of competence units. Thus, CCI emerges as a well-founded and indispensable component of the high school

Geography curriculum in both Romania and the Republic of Moldova and simultaneously as a formative element in the initial training of teaching staff.

The analysis and statistical interpretation of the results from the pedagogical experiment (3.3), support the following scientific theses:

1. The validation of the experimental research was carried out in accordance with the descriptors of the developmental levels of CCI components, developed based on the current performance standards for the subject of Geography in the Republic of Moldova. This validation was aligned with the specification matrix constructed for the stages of the investigative cycle. The initial and final assessment tests measured the same CCI components had the same structure and number of item types and were statistically validated using SPSS functions.

2. The Pedagogical Model for the Development of Research/Investigative Competence in Geography in High School Cycle (MDCCIDGCL), developed on the basis of the pedagogical model - MPDCCIDGCL, was validated through experimental practice, as the results obtained in the Experimental Group (LE) were significantly superior to those in the Control Group (LC) at all stages. The general research hypothesis and the secondary hypotheses were confirmed. The research conducted within the doctoral thesis effectively addressed the research problem through the achievement of the proposed objectives in all phases of the pedagogical experiment.

The applicability of our research innovations in school praxis, during Geography lessons in formal, non-formal and informal educational activities can be concretized into the following recommendations:

- modular curriculum design based on macro-mathetic content aligned with the stages of the investigative cycle: question formulation - data collection - analysis and interpretation of results - conclusion formulation - reflection;
- integration of cognitive scenarios based on key questions and logical stages and their use during in-depth lessons, formative assessment sessions or research projects;
- use of investigation worksheets that include diverse investigative supports such as texts, graphic representations, and cartographic materials;
- engaging students in real-life learning contexts, by investigating issues related to their local environment;
- inclusion of individual or group research projects in the student portfolio to serve as both an alternative assessment tool for the depth of the competence attained and a formative tool for all components of CCI, with potential for scientific innovation;
- lesson planning based on a cyclical reflection-action-reflection model, by incorporating mini-research projects into each learning unit and emphasizing the reflective framework of investigation at each stage of the lesson through self-assessment sheets and reflective journals, aimed at fostering a conscious and critical relationship with one's own learning process;
- use of formative assessments, based on clearly defined and staged criteria.

In order to address the educational discrepancies between normative

documents and actual school practices, we recomand:

- to the competent authorities in Romania and the Republic of Moldova: to implement structural revisions of the high school curriculum framework and develop a Geography curriculum based on learning pathways, aligned with the principle of progressive, spiral development of school competences across educational cycles, following the model of deriving CCI. Additionally, design teaching aids that guide both the initial and continuous training of teachers in relation to the MDCCIDGCL, developed on the basis of the elaborated pedagogical model.
- to researchers: extrapolate the results of this study to the development of CCI in other school subjects, with an emphasis on fostering interdisciplinary approaches for cultivating students' research-related knowledge, skills and attitudes.
- to geography teachers and teachers of other disciplines: promote a classroom culture of research by encouraging scientific curiosity, inviting geographers, specialists and researchers to engage with students, organizing project exhibitions and creating local resources and databases useful for future investigations. Further recommendations include: integrating interdisciplinary research both thematically and methodologically; creating evaluation tools for CCI such as worksheets, rubrics and rating scales for assessing its components: spatial thinking, hypothesis formulation, method selection, data analysis and interpretation and reflective practice; establishing a spatial thinking lab at the high school level-physical or virtual learning spaces for research-based learning-through partnerships with universities or environmental NGOs.

The results obtained in the thesis contribute to solving a significant scientific problem: the effective development of Research/Investigative Competence in Geography in the High School Cycle, as a continuation of competence formation begun in lower secondary education, using a discovery-based learning methodology. This methodology is grounded in the scientific foundations of the MPCCIDGCL, whose pedagogical relevance is reflected in the graduate profile of high school students.

Despite the thesis's significant contributions, several empirical limitations can be identified as the small size of the experimental sample relative to the scale of the research problem, which characterizes the entire Romanian high school education system and the limited instructional time allocated to Geography in vocational high schools (1 hour/week), with no concrete compensatory solutions available through optional courses.

This thesis retains the status of *opera aperta* offering the opportunity to be extended and updated in light of new discoveries in the fields of educational sciences and the didactics of Geography. Teleologically, by contributing both theoretical and practical knowledge, the thesis supports the development of innovative teaching approaches tailored to the needs of high school Geography students and aligned with the demands of contemporary society which emphasizes and sustains lifelong learning for adults.

BIBLIOGRAPHY

1. BOTGROS, Ion, FRANŢUZAN, Ludmila, SIMION Crenguţa. *Competenţa de cunoaştere ştiinţifică - sistem optimizator. Ghid metodologic*. Chişinău: IŞE, 2015. 128 p. ISBN 978-9975- 48-076-5.
2. CIASCAI, Liliana. *Model ciclic de predare - învăţare bazat pe investigaţie*. Cluj-Napoca: Presa Universitară Clujeană, 2016, 56 p. ISBN 978-606-37-0109-2.
3. CRISTEA, Sorin. *Fundamentele ştiinţelor educaţiei. Teoria generală a educaţiei.* Chişinău: Litera, 2003. 240 p. ISBN 9975-74-560-1 33.
4. DULAMĂ, Maria, Eliza. *Didactică axată pe competenţe*. Ediţia a 2-a, Cluj-Napoca: Presa Universitară Clujeană, 2012, 508 p. ISBN 978-973-595-330- 0.
5. FRANŢUZAN, Ludmila. Formarea competenţei de cunoaştere ştiinţifică la liceeni în context inter-/transdisciplinar. Teză de doctor în pedagogie. Chişinău, 2009.
6. IONESCU, Miron, RADU, Ioan. Didactica modernă. Cluj Napoca: Imprimeria Ardealul, 1995. 288 p.
7. JOIŢA, Elena. Educaţia cognitivă. Fundamente. Metodologie. Bucureşti: Polirom. 2002. 248 p. ISBN 973-681-100-X.
8. MĂNDRUŢ, Octavian, Dan, Steluţa. Geografie - Curriculum şcolar. Ghid metodologic pentru învăţământul preuniversitar. Bucureşti: Editura Corint Educaţional, 2015. 160 p. ISBN 978-606-782-012-6.
9. MICLEA, Mircea. Psihologie cognitivă. Modele teoretico-experimentale. Iaşi: Polirom, 1999. 344 p. ISBN 973-683-248-1.
10. NEACŞU, Ioan. Neurodidactica învăţării şi psihologia cognitivă. Ipoteze. Conexiuni. Mecanisme. Iaşi: Polirom. 2019. 192 p. ISBN 978-973-46-7849-5.
11. NICOLA, Ioan. Tratat de pedagogie şcolară, Bucureşti: Aramis, 2003. 480 p. ISBN 973-8473-64-0.
12. SĂNDULEAC, Sergiu. Teoria şi metodologia dezvoltării şi eficientizării gândirii ştiinţifice la pedagogi (formarea iniţială şi continuă). Teză de doctor habilitat în ştiinţe ale educaţiei. Chişinău, 2024. 445 p.
13. SCLIFOS, Lia. Repere psihopedagogice ale formării competenţei investigaţionale la liceeni. Teză de doctor în pedagogie. Chişinău, 2007.
14. STOICA, Adrian. Evaluarea progresului şcolar. De la teorie la practică. Bucureşti: Humanitas Educaţional, 2003. 160 p. ISBN 973-8289-688-8.
15. ŞTEFAN, Mircea. Teoria situaţiilor educative. Bucureşti: Aramis Prut, 2003. 208 p.
16. TELEMAN, Angela. Formarea competenţei de explorare/investigare a proceselor ecologice la elevii claselor primare. Teză de doctor în pedagogie. Chişinău, 2010.
17. VOLONTIR, Nina et al. Ghid de bune practici pentru investigaţii asupra mediului cu elevii din învăţământul preuniversitar şi educaţie ecologică: Chişinău: CEP UPS "Ion Creangă", 2023. 117 p. ISBN 978-9975-46-845-9.
18. ZLATE Mielu. Psihologia mecanismelor cognitive. Iaşi: Polirom 2000. 2004. 521 p.

Resurse electronice

19. BOTGROS, Ion, FRANŢUZAN, Ludmila, BOCANCEA, Viorel. Componentele paradigmei formării competenţei de cunoaştere ştiinţifică în învăţământul preuniversitar. În: Acta et commentationes. Ştiinţe ale Educaţiei. 2013, nr. 1(2), pp. 40-48. Chişinău. ISSN 1857-0623. Disponibil: https://ibn.idsi.md/vizualizare_articol/50874
20. CABAC, Valeriu. Competenţele-cheie şi transdisciplinaritatea. În: Traditie şi inovare în cercetarea ştiinţifică. Ediţia 11, Vol. I, 7 octombrie 2022, Bălţi. Bălţi: Universitatea de Stat „Alecu Russo" din Bălţi, 2022, pp. 5-8. ISBN 978-9975-50-297-9. Disponibil: https://ibn.idsi.md/vizualizare_articol/171934
21. COROPCEANU Eduard. Dezvoltarea sistemului de competenţe cercetare-inovare antreprenoriat în context interdisciplinar. În: Congresul Ştiinţific Internaţional Polono Moldo-Român: Educaţie – Politică – Societate, 1-4 aprilie 2019. Chişinău-Iaşi, nr. 1, p. 19-25. Disponibil: https://ibn.idsi.md/sites/default/files/imag_file/19-25_13.pdf
22. GUŢU, Vladimir. Cadrul situaţional al competenţei: logica acţiunii, logica curricalară, logica învăţării. În: Integrare prin cercetare si inovare. Ştiinţe sociale. Rezumate ale comunicărilor . 8-9 noiembrie 2018, Chişinău. Chisinau, Republica Moldova: CEP USM, 2018, 2018, pp. 97-100. Disponibil:https://ibn.idsi.md/vizualizare_articol/79820
23. MASCIOTRA, Domenico. La compétence comme pouvoir adaptatif aux situation nouvelles. Ministére de l'éducation du Québec, Direction de la formation générale des adultes, 2005. Disponibil:https://www.academia.edu/1116760/La_comp%C3%A9tence_comme_pouvoir_adaptatif_aux_situations_nouvelles
24. ZWARTJES, Luc (coord.). Necesitatea integrării gândirii geospaţiale în educaţie. Manualul implementării competenţelor gândirii geospaţiale în curriculum. 2018, 16 p. Disponibil: https://biblio.ugent.be/publication/8623277/file/8623278.pdf
25. *** Cartea internaţională asupra educaţiei prin geografie. Nuremberg, 1992. ISBN 3-925319-11- 5. Disponibil: https://www.igu-cge.org/wp-content/uploads/2018/02/16.-Romanian.pdf
26. ***Codul Educaţiei. Publicat: 24.10.2014 în Monitorul Oficial Nr. 319-324, art. Nr: 634; data intrării în vigoare: 23.11.2014 (cu modificările ulterioare: 2016, 2017, 2018, 2019). Disponibil la: www.mecc.gov.md.
27. ***Concepţia dezvoltării curriculumului şcolar. Aprobată prin ordinul Ministrului educaţiei şi cercetării nr.55 din 15 ianuarie 2025. Disponibil: https://mec.gov.md/.../last_version_copy_compressed_1_0.pdf
28. ***Legea învăţământului preuniversitar. Disponibil: https://edu.ro/sites/default/files/_fi%C8%99iere/Minister/2023/Legi_educatie_Romania_educata/legi_monitor/Legea_invatamantului_preuniversitar_nr_198.pdf
29. *** Learning to Think Spatially. National Research Council. Washington, DC: The National Academies Press. 332 p. 2006. ISBN 978-0-309-09208-1. Disponibil. https://nap.nationalacademies.org/catalog/11019/learning-to-think-spatially
30. ***Profilul de formare al absolventului. Aprobat prin Ordinul 6731/2023. Disponibil: https://sintact.ro/legislatie/monitorul-oficial/ordinul-6731-2023-privind-aprobarea-profilului-de-formare-al-17023789
31. ***Strategia naţională de dezvoltare - Moldova europeană 2030. Disponibil: https://gov.md/ro/moldova2030

LIST OF THE AUTHOR'S PUBLICATIONS ON THE TOPIC OF THE THESIS

Articles in various scientific journals:
Articles in Category B journals - 3

1. **DUMITRAȘCU, Doina Maria**. Dezvoltarea competenței de cercetare/investigare în opinia profesorilor de Geografie. In: *Acta et commentationes. Științe ale Educației*. 2023, nr. 3(33), pp. 175-187. ISSN 1857-0623. Disponibil: https://doi.org/10.36120/2587-3636.v33i3.175-187, https://ibn.idsi.md/vizualizare_articol/189708
2. BOCANCEA, Viorel, **DUMITRAȘCU, Doina Maria**. Dezvoltarea competenței de cercetare/ investigare prin metoda crochiului geografic. In: *Univers Pedagogic*. 2023, nr. 2(78), pp. 50-58. ISSN 1811-5470. DOI: https://doi.org/10.52387/1811-5470.2023.2.08, https://ibn.idsi.md/vizualizare_articol/191126
3. **DUMITRAȘCU, Doina Maria**. Modelul conceptual de dezvoltare a competenței de cercetare/investigare la liceeni la disciplina Geografie. In: *Acta et commentationes. Științe ale Educației*. 2023, nr. 4(34), pp. 66-75. ISSN 1857-0623. DOI: https://doi.org/10.36120/2587-3636.v34i4.66-75, https://ibn.idsi.md/vizualizare_articol/195792

Publications at scientific events in the Republic of Moldova

- **Publications at scientific events in the Republic of Moldova (included in the Registers of scientific events approved by ANACEC) - 4**

1. **DUMITRAȘCU, Doina Maria**. Dezvoltarea competenței de investigare prin intermediul proiectelor educaționale. In: *Instruire prin cercetare pentru o societate prosperă*. Ediția 8, Vol.1, 20-21 martie 2021, Chișinău. Chișinău: Tipografia Universității de Stat din Tiraspol, 2021, pp. 350-355. ISBN 978-9975-76-327-1. https://ibn.idsi.md/vizualizare_articol/127619
2. **DUMITRAȘCU, Doina Maria**. Caracterul teleologic al competenței de investigare - provocare a educației prin geografie. In: *Dezvoltarea umană în Republica Moldova din perspectiva resurselor naturale, socioeconomice și turistice*. 16 aprilie 2021, Chișinău. Chisinau, Republic of Moldova: Universitatea de Stat din Tiraspol, 2021, pp. 21-24. ISBN 978-9975-76-355-4 (PDF). https://ibn.idsi.md/vizualizare_articol/141026
3. **DUMITRAȘCU, Doina Maria**. Abordări metodologice ale dezvoltării competenței de investigare geografică la liceeni în contextul științelor pământului. In: *Educația în fața noilor provocări*. Vol.1, 5-6 noiembrie 2021, Chisinau. Chișinău: Universitatea de Stat din Tiraspol, 2021, pp. 268-274. ISBN 978-9975-76-371-4. https://ibn.idsi.md/vizualizare_articol/148987
4. **DUMITRAȘCU, Doina Maria**. Aspecte teoretice ale competenței de investigare și ale termenilor conecși. In: *Probleme actuale ale științeconomice umanisticeAnalele științifice ale doctoranzilor și competitorilor*. Vol.19, Partea 1, 1 ianuarie 2021, Chișinău. Chișinău: CEP UPS „I.Creangă", 2021, pp. 162-172. ISBN 978-9975-46-235-8. https://ibn.idsi.md/vizualizare_articol/155829

- **Publications at other events in the Republic of Moldova - 16**

1. **DUMITRAȘCU, Doina Maria**. Competența de a investiga la Geografie între "Savoir agir" și "Agir". In: *Materialele Conferinței Republicane a Cadrelor DidacticeDidactica științelor naturii*. Vol. 2, 27-28 februarie 2021, Chișinău. Chișinău, Republica Moldova: Tipografia Universității de Stat din Tiraspol, 2021, pp. 33-37. ISBN 978-9975-76-319-6. https://ibn.idsi.md/vizualizare_articol/123907
2. **DUMITRAȘCU, Doina Maria**. Volunteered geographic information impetus pentru dezvoltarea competenței de investigare geografică la liceeni. In: *Dialog intercultural polono-moldovenesc*. Vol. IV, nr.2, 14-15 mai 2021, Chișinău. Chișinău: Tipografia UST, 2021, pp. 140-145. ISBN 978-9975- 76-207-6. https://ibn.idsi.md/vizualizare_articol/141292
3. **DUMITRAȘCU, Doina Maria**. Provocările dezvoltării emoționale ale nativilor și imigranților digitali, parteneri în procesul de dezvoltare a competenței de investigare geografică a orizontului local. In: *Cultura cercetării pedagogice: provocări și tendințe contemporane*. Ediția 1, Vol.3, 5-6 iunie 2021, Chișinău. Chișinău: Tipografia Universității de Stat din Tiraspol, 2021, pp. 67-73. ISBN 978-9975-76-345-5. https://ibn.idsi.md/vizualizare_articol/141571
4. **DUMITRAȘCU, Doina Maria**. Mediul virtual personal de învățare – factor favorizant al dezvoltării competenței de investigare la disciplina geografie. In: *Educația din perspectiva conceptului Clasa Viitorului*. Ediția 1, 27 noiembrie 2020, Chisinau. Chișinău: SRL „Garomont Studio", 2020, pp. 71-74. https://ibn.idsi.md/vizualizare_articol/150163
5. **DUMITRAȘCU, Doina Maria**. Competența de elaborare a unui demers investigativ la disciplina geografie din perspectiva educației intelectuale. In: *Instruire prin cercetare pentru o societate prosperă. Biologie*. Ediția 9, Vol.1, 19-20 martie 2022, Chișinău. Chișinău: Tipografia Universității de Stat din Tiraspol, 2022, pp. 182-188. ISBN 978-9975-76-389-9. https://ibn.idsi.md/vizualizare_articol/152539
6. **DUMITRAȘCU, Doina Maria**. Gândirea spațială geografică, expresie a gândirii științifice – abilitate a competenței de investigare. In: *Condiții pedagogice de optimizare a învățării în post criză pandemică prin prisma dezvoltării gândirii științifice*. 18-22 iunie 2021, Chisinau. Chișinău: CEP UPS „I.Creangă", 2021, pp. 49-53. ISBN 978-9975-46-541-0. DOI: https://doi.org/10.46728/c.18-06-2021.p49-53, https://ibn.idsi.md/vizualizare_articol/154477
7. **DUMITRAȘCU, Doina Maria**. Dezvoltarea competenței de investigare geografică în ciclul liceal – condiție sine qua non a atigerii autonomiei învățării pe tot parcursul vieții. In: *Probleme ale științeisocioumanistice și modernizării învățământului*. Seria 23, Vol.3, 26 martie 2021, Chișinău. Chișinău: CEP UPS „I.Creangă", 2021, pp. 69-73. ISBN 978-9975-46-559-5; 978-9975-46-562-5. https://ibn.idsi.md/vizualizare_articol/155706
8. **DUMITRAȘCU, Doina Maria**. Importanța dezvoltării gândirii spațiale geografice la liceeni în cadrul competenței de investigare. In: *Adaptarea sistemului educațional la noile abordări din societatea contemporană: provocări și soluții*. 18-19 august 2022, Chișinău. Chișinău: Tipografia Universității de Stat din Tiraspol, 2022, pp. 269-276. ISBN 978-9975-76-417-9 (PDF). https://ibn.idsi.md/vizualizare_articol/175983
9. **DUMITRAȘCU, Doina Maria**. Contextualitatea competenței de cercetare/investigare ca putere adaptivă în situații educative semnificative. In: *Instruire prin cercetare pentru o societate prosperă*. Ediția 10, Vol.2, 18-19 martie 2023, Chișinău. Chișinău: Tipografia Universității de Stat din Tiraspol, 2023, pp. 26-30. ISBN 978-9975-46-716-2. DOI: https://doi.org/10.46727/c.v2.18-19-03-2023.p26-30, https://ibn.idsi.md/vizualizare_articol/179207
10. **DUMITRAȘCU, Doina Maria**. Planificarea competenței de cercetare/investigare la liceeni la disciplina geografie în baza modelului modular de instruire . In: *Science and education: new approaches and perspectives*. Seria 25, Vol.3, 24-25 martie 2023, Chișinău. Chișinău: CEP UPSC, 2023, pp. 385-388. ISBN 978-9975-46-787-2. DOI: https://doi.org/10.46727/c.v3.24-25-03-2023.p385-388, https://ibn.idsi.md/vizualizare_articol/189490
11. **DUMITRAȘCU, Doina Maria**. Aspecte ale dezvoltării atitudinii de cercetare/investigare a mediului geografic la liceeni. In: *„Research – Innovation – Innovative Entrepreneurship"International Congress*. 13-14 octombrie 2023, Chișinău. Chișinău: CEP UPSC, 2023, pp. 137-144. ISBN 978-9975-46-831-2. https://ibn.idsi.md/vizualizare_articol/192442
12. **DUMITRAȘCU, Doina Maria**. Autoreglarea procesului formativ de dezvoltare a competenței de cercetare/investigare la disciplina geografie utilizând jurnalul reflexiv. In: *Probleme actuale ale științelor umanistice*. 1 ianuarie 2023, Chișinău. Chișinău: CEP UPS „I.Creangă", 2023, pp. 90-93. ISBN 978-9975-46-849-7. https://ibn.idsi.md/vizualizare_articol/203129
13. **DUMITRAȘCU, Doina Maria**. Importanța utilizării hărții geografice în dezvoltarea abilităților de investigare la disciplina geografie. In: *Probleme actuale ale științelor umanisticeAnalele științifice ale doctoranzilor și competitorilor*. Vol.20, Partea 1, 11 mai 2022, Chișinău. Chișinău: CEP UPS „I.Creangă", 2022, pp. 66-69. https://ibn.idsi.md/vizualizare_articol/171411
14. IORDACHE (NEAGU), Marieta, **DUMITRAȘCU, Doina Maria**. Abordări ale evaluării competenței de investigare prin proiecte de cercetare. In: *Învățământul superior: tradiții, valori, perspective*. Vol. 1, 29-30 septembrie 2023, Chișinău. Chișinău: CEP UPS „I.Creangă", 2023, pp. 367-375. ISBN 978-9975-46-816-9. DOI: https://doi.org/10.46727/c.29-30-09-2023.p367-375, https://ibn.idsi.md/vizualizare_articol/203669
15. **DUMITRAȘCU, Doina Maria**. Aspecte metodologice ale utilizării de către liceeni a proiectului de cercetare în dezvoltarea competenței de cercetare/investigare la disciplina geografie. In: *Science and education: new approaches and perspectives*. Seria 26, Vol.4, 21-22 martie 2024, Chișinău. Chișinău: CEP UPSC, 2024, pp. 214-220. ISBN 978-9975-46-943-2.Disponibil: https://ibn.idsi.md/vizualizare_articol/214624
16. **DUMITRAȘCU, Doina Maria**. Integrated development of the research/investigative competence in the geography discipline in the high school cycle. In: *Education, Policies, Society*. 13-15 martie 2023, Chișinău. Chișinău: CEP UPS „I.Creangă", 2023, pp. 45-46. ISBN 978-9975-46-897-8 (PDF). https://ibn.idsi.md/vizualizare_articol/209217

ADNOTARE

DUMITRAȘCU Doina Maria

Dezvoltarea competenței de cercetare/investigare la disciplina Geografie în ciclul liceal, teză de doctor în științe ale educației, Chișinău, 2025

Structura tezei include: introducere, 3 capitole, concluzii generale și recomandări, bibliografie din 261 de surse, adnotare (română), concepte-cheie, lista abrevierilor, 150 pagini de text de bază, 39 tabele, 30 figuri, 19 anexe, publicații la tema tezei - 31 lucrări științifice.

Cuvinte-cheie: competență școlară, competență de cercetare/investigare, competența de cercetare/investigare la Disciplina Geografie, competențe specifice Geografiei, ciclu liceal, ciclu de investigare, gândirea spațial geografică.

Domeniul de studiu se referă la didactica școlară pe trepte și discipline de învățământ și abordează problema dezvoltării competenței de cercetare/investigare în cadrul ciclului liceal la disciplina Geografie.

Scopul cercetării rezidă în determinarea reperelor teoretice și metodologice ale dezvoltării CCI, în vederea elaborării Modelului pedagogic de dezvoltarea al competenței de cercetare/investigare la disciplina Geografie în ciclul liceal și a metodologiei specifice, validată prin experiment pedagogic.

Obiectivele cercetării au vizat: elaborarea cadrului conceptual de dezvoltare al CCI ca finalitate a sistemului de învățământ la disciplina Geografie în ciclul liceal prin delimitarea conceptelor de bază; identificarea reperelor metodologice de dezvoltare CCI în baza analizei literaturii de specialitate, a cadrului normativ și a modelelor pedagogice de dezvoltare a competențelor școlare; conceptualizarea modelului pedagogic de dezvoltare al competenței de cercetare/investigare la disciplina Geografie în ciclul liceal și a metodologiei aferente; validarea prin experiment pedagogic a eficienței MDCCIDGCL elaborată în baza MPCCIDGCL prin analiza statistico - matematică a rezultatelor experimentului pedagogic.

Noutatea și originalitatea științifică a cercetării este obiectivată de dezvoltarea CCI ca o competență școlară specifică Geografiei în ciclul liceal prin conținuturi integrate și metodologie caracteristică (proiectare curriculară pe linii de învățare, perspectivă geografică și suporturi cartografice), o competență în act, înțeleasă ca putere adaptativă la soluționarea problemelor reale de viață, modelate curricular ca situații semnificative de învățare, prin parcurgerea de către elevi a etapelor unui ciclu de acțiune-reflecție-acțiune, conform MPCCIDGCL și MDCCIDGCL.

Rezultate obținute care contribuie la soluționarea unei probleme științifice importante în cercetare vizează conceptualizarea MPCCIDGCL și validarea experimentală a MDCCIDGCL care a condus la formarea eficientă a componentelor CCI în cadrul profilului absolventului de liceu.

Semnificația teoretică a cercetării: concretizarea unui cadru definițional al competenței școlare ca un agregat de cunoștințe științifice, cunoștințe epistemice, abilități, atitudini și valori; conceperea taxonomiei termenilor pedagogici din domeniul de definire a CCI; descrierea importanței elementelor formative CCI prezente în abordări curriculare geografice internaționale (investigația științifică, ciclul de investigare, perspectiva geografică, gândirea spatial geografică) și în psihologia cognitivă și neuroștiințe (scenarii cognitive); derivarea CCI din cadrul teoretic și normativ educational actual; conceptualizarea MPCCIDGCL pe șase cadre care reflectă dezvoltarea componentelor CCI în cadrul profilului absolventului de liceu; elaborarea modular și sistemic a MDCCIDGCL cu abordare integrată și problematizată a conținuturilor curriculare; descrierea nivelurilor de dezvoltare CCI (reproductiv, productiv-creativ, inovativ) raportat la capacitățile cognitive, tipurile de gândire și tipurile de cunoștințe implicate; descrierea criterială a componentelor CCI; exemplificarea de tipuri de sarcini de lucru, proiecte de cercetare și teste de evaluare; redactarea de concluzii și recomandări pentru direcții viitoare de cercetare.

Valoarea practică a cercetării constă în aplicabilitatea MDCCIDGCL în ciclul liceal și gradul ridicat de flexibilizare în alte contexte educaționale (discipline școlare, abordări transversale), nivel de școlarizare, conținuturi curriculare prin: descrierea nivelurilor CCI și a nivelurilor de dezvoltare a componentelor sale, abordarea modulară a proiectării CCI în baza etapelor CI, abordarea sistemică a procesului instructiv de dezvoltare CCI, exemplificare sarcinilor de lucru conform etapelor CI, elaborarea tipologiei proiectelor de cercetare specifice Geografiei și utilizare scenariilor cognitive în dezvoltarea cunoștințelor, abilităților, atitudinii și valorilor de investigare în toate etapele CI.

Implementarea rezultatelor științifice s-a efectuat prin desfășurarea și validarea experimentului pedagogic în cadrul Colegiul Tehnic „Ghorghe Cartianu" Piatra Neamț și prin intermediul activității publicistice și de diseminare în cadrul manifestărilor științifice.

АННОТАЦИЯ

Думитрашку Дойна Мария

Развитие исследовательской компетенции по географии в старшей школе

Диссертация на соискание ученой степени доктора наук в области педагогических наук, Кишинёв, 2025

Структура диссертации включает: введение, 3 главы, общие выводы и рекомендации, библиографию (261 источник), аннотацию (на румынском языке), ключевые понятия, список сокращений, 150 страниц основного текста, 39 таблиц, 30 рисунков, 19 приложений, публикации по теме диссертации - 31 научная работа.

Цель исследования : определить теоретические и методологические ориентиры развития исследовательской компетенции (ИК), с целью разработки педагогической модели развития ИК по географии в старшей школе и соответствующей методологии, подтверждённой педагогическим экспериментом.

Задачи исследования: 1. Разработка концептуальной основы развития ИК как цели образовательной системы по географии в старшей школе путем определения базовых понятий. 2. Выявление методологических ориентиров развития ИК на основе анализа научной литературы, нормативной базы и педагогических моделей формирования школьных компетенций. 3. Концептуализация педагогической модели развития исследовательской компетенции по географии в старшей школе и концептуализация соответствующей методологии. 4. Проверка эффективности методологии развитья исследовательской компетенции по географии в старшей школе (МРИКГСШ), разработанной на основе педагогической модели развитья исследовательской компетенции по географии в старшей школе (ПМРИКГСШ) с помощью педагогического эксперимента с использованием статистико-математического анализа результатов.

Новизна и научная оригинальность исследования выражаются в разработке ИК по географии как школьной компетенции, специфичной для курса географии на уровне старшей школы, посредством интегрированного содержания и характерной методологии куррикулярное проектирование по линиям обучения, географическая перспектива и картографические материалы). Эта компетенция реализуется в действии и понимается как адаптивная способность к решению реальных жизненных проблем, которые представлены в учебном плане как значимые учебные ситуации, проходящие через этапы цикла «действие–рефлексия–действие» в соответствии с ПМРИКГСШ и МРИКГСШ.

Полученные результаты, способствующие решению важной научной проблемы, касаются концептуализации ПМРИКГСШ и экспериментальной валидации МРИКГСШ, что привело к эффективному формированию компонентов ИК в структуре профиля выпускника старшей школы.

Теоретическое значение исследования заключается: в конкретизации определяющей основы школьной компетенции как совокупности научных знаний, эпистемологических знаний, умений, установок и ценностей; в разработке таксономии педагогических терминов в области определения ИКГ; в описании значимости формирующих элементов ИК, представленных в международных географических учебных подходах (научное исследование, исследовательский цикл, географическая перспектива, пространственно-географическое мышление) и в когнитивной психологии и нейронауках (когнитивные сценарии); в выведении ИК из текущих теоретических и нормативных образовательных основ; в концептуализации ПМРИКГСШ по шести рамкам, отражающим развитие компонентов ИК в профиле выпускника; в модульной и системной разработке МРИКГСШ с интегрированным и проблемным подходом к учебному содержанию; в описании уровней развития ИКГ (воспроизводящий, продуктивно-креативный, инновационный) в связи с когнитивными способностями, типами мышления и типами задействованных знаний; критерии описания компонентов ИКГ; в разработке примеров различных типов заданий, исследовательских проектов и оценочных тестов; в формулировке выводов и рекомендаций по направлениям дальнейших исследований.

Практическая значимость исследования заключается в применимости ПМРИКГСШ и её высокой адаптивности к другим образовательным контекстам (учебные предметы, межпредметный подход), уровням образования и учебному содержанию, что обеспечивается: - описанием уровней ИК и этапов развития её компонентов; - модульным подходом к проектированию ИК на основе этапов исследовательского цикла; - системным подходом к обучающему процессу формирования ИК; - примерами заданий разделенных по этапам цикла и способам сопровождения исследовательской деятельности; - разработкой типологии исследовательских проектов по географии и использованием когнитивных сценариев для развития знаний, умений, установок и ценностей, связанных с исследованием, на всех этапах цикла.

Внедрение научных результатов осуществлялось через проведение педагогического эксперимента и утверждение его результатов в Техническом колледже им. Георге Картиану, г. Пьятра-Нямц, а также через публикации и участие в научно-педагогических мероприятиях.

ANNOTATION

DUMITRAȘCU Doina Maria

Developing Research/Investigative Competence in Geography in the High School Cycle, Doctoral Thesis in Educational Sciences, Chișinău, 2025

The thesis structure comprises: introduction, 3 chapters, general conclusions and recommendations, bibliography with 261 sources, annotation (in Romanian), key concepts, 150 pages of main text, 39 tables, 30 figures, 19 annexes. Results published in 31 scientific papers.

Key concepts: school competence, research/investigative competence, research/investigative competence in Geography, specific competences of Geography in high school level, investigative cycle, geographical spatial thinking.

Field of study: refers to school didactics across levels and disciplines and addresses the issue of developing research/investigative competence within the high school cycle in Geography.

The research aim lies in determining the theoretical and methodological foundations for the development of research/investigation competence (CCI), in order to elaborating a Pedagogical Model for the development of research/investigation competence in Geography at the high school level, along with a specific methodology, validated through a pedagogical experiment.

Research objectives are: the development of the conceptual framework of Research/Investigative Competence in Geography in the High School Cycle, as a key educational outcome from secondary level, through the delineation of core concepts; the identification of methodological benchmarks for fostering CCI, based on the analysis of the specialized literature, the regulatory framework, and pedagogical models for competence development in education; the conceptualization of a pedagogical model for developing research/investigative competence in Geography at the high school level, along with the associated methodology; the validation of the effectiveness of the MDCCIDGCL elaborated on MPCCIDGCL through a pedagogical experiment, using statistical and mathematical analysis of the experimental results.

The scientific novelty and originality of the research are evidenced by the development of Research/Investigative Competence as a subject-specific school competence within high school geography, through integrated content and a characteristic methodology (curriculum design based on learning lines, a geographical perspective and the use of cartographic supports), conceptualized as an adaptive power to solve real-life problems curricularized as meaningful learning situations and developed by students through the stages of an action-reflection-action cycle, in accordance with MPCCIDGCL and MDCCIDGCL.

The results contibue to solve a significant scientific research problem pertain to the conceptualization of the MPCCIDGCL and the experimental validation of the MDCCIDGCL, which has led to the effective formation of CCI components within the profile of the high school graduate.

The theoretical significance of the research lies in: the elaboration of a definitional framework for school competence as an aggregate of scientific knowledge, epistemic knowledge, skills, attitudes and values; the development of a taxonomy of pedagogical terms related to CCI; the description of formative elements of CCI as reflected in international geography curricula and in cognitive psychology and neuroscience (e.g. cognitive scenarios); the derivation of CCI from the current theoretical and normative educational framework; the conceptualization of the MPCCIDGCL through six frameworks; the modular and systemic design of the MDCCIDGCL with an integrated and inquiry-based approach to curricular content; the description of levels of CCI development (reproductive, productive-creative, innovative) in relation to cognitive abilities, types of thinking and types of knowledge involved; the criterion-based description of CCI components; the examples of task types, research projects and assessment tests; the drafting of conclusions and recommendations for future research directions.

The practical value of the research lies in the applicability of the MDCCIDGCL to high school education and its high degree of adaptability to other educational contexts (different school subjects, cross-curricular approaches), educational levels, and curricular content through: the description of CCI levels and the developmental levels of its components; the modular approach to designing CCI based on inquiry stages; the systemic approach to the instructional process of developing CCI; examples of tasks aligned with the inquiry stages; the development of a typology of geography-specific research projects; the use of cognitive scenarios to foster the development of knowledge, skills, attitudes, and values related to investigation throughout all stages of the inquiry process.

The implementation of scientific results: took place through the conduct and validation of pedagogical experimentation within ”Ghorghe Cartianu” Technical College, Piatra Neamț, as well as through publishing and dissemination activities in scientific events.

DUMITRAȘCU DOINA-MARIA

DEVELOPING RESEARCH/INVESTIGATIVE COMPETENCE IN GEOGRAPHY IN THE HIGH SCHOOL CYCLE

SPECIALITY 532.02. SCHOOL DIDACTICS ON EDUCATION LEVELS AND SUBJECTS (Geography)

Summary of PhD Thesis in Education Sciences

Approved for publishing: 22.05.2025 Paper format 60×841/16
Paper offset. Type offset. Print run: 30 copies
Pattern printed sheets: 2,1 Order nr. 59

„Ion Creangă" State Pedagogical University, Chișinău,
1 Ion Creangă Street, Republic of Moldova, MD-2069