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PEDAGOGICAL, PSYCHOLOGICAL, AND DIDACTIC FOUNDATIONS OF INFORMATION ANALYSIS COMPETENCE

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Abstract
This article examines the pedagogical, psychological, and didactic foundations of developing information analysis competence among students. It analyzes the significance of locating, perceiving, understanding, filtering, comparing, synthesizing, and analyzing information, as well as drawing evidence-based conclusions in the holistic development of the student's personality. Particular emphasis is placed on the gradual, age-appropriate, and psychologically differentiated advancement of information-processing skills in primary education. Furthermore, the study explores effective instructional methodologies anchored in competency-based, activity-oriented, problem-based, and interactive educational paradigms. It substantiates the essential pedagogical conditions required to cultivate independent critical inquiry, logical reasoning, and evidence-supported decision-making capabilities when interacting with diverse information environments.

Keywords: Information, information analysis, competence, information competence, pedagogical foundations, psychological foundations, didactic foundations, critical thinking, independent thinking, logical thinking, information literacy, learning activity, PIRLS, UNESCO MIL.

Introduction

Developing information analysis competence is one of the most critical factors underpinning autonomous learning activities in the modern educational paradigm. Today's young learners are no longer confined to static knowledge presented within standard textbooks; instead, they are immersed in substantial volumes of heterogeneous data accessed through diverse information sources, digital learning platforms, illustrative media, statistical tables, diagrams, and digital tools. Under these transformative conditions, the primary pedagogical mandate is not merely delivering an extensive quantity of factual data, but teaching students how to purposefully select, comprehend, interconnect, evaluate, and productively utilize existing information.

Throughout the process of information analysis, a learner executes several concurrent cognitive operations: deconstructing information into core components, identifying structural interrelations, contrasting commonalities and divergences, determining cause-and-effect mechanisms, isolating vital data from secondary details, and synthesizing insights into reasoned

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deductions. Consequently, information analysis competence cannot be equated merely with reading fluency or elementary text comprehension. It constitutes a multifaceted meta-competence that unifies multiple cognitive dimensions of learning and cognitive activity.

In primary education, cultivating this competence relies heavily on establishing meaningful links between learners' prior knowledge and newly acquired data. When students compare new information with previously learned concepts, they grasp its essence far more profoundly. For instance, when reading a text on animal habitats, students should not merely recite factual details; they must cross-reference this information with prior schema, identify what is novel, and articulate their own deductions. Such intellectual engagement transforms learning from rote mechanical memorization into active cognitive data processing.

From a psychological perspective, information analysis is intrinsically linked with executive cognitive control: the deliberate regulation of attention, retention and retrieval of data in memory, execution of logical operations, and linguistic verbalization of insights. Hence, instructional tasks must strictly align with primary pupils' cognitive maturity. Repeating tasks of identical cognitive complexity constrains intellectual growth; conversely, graduated, progressively challenging inquiry scaffolds the acquisition of higher-order analytical operations.

In this regard, the teacher's questioning methodology plays a transformative role. Transitioning systematically from reproductive prompts (e.g., "What happened in the text?") to analytical and evaluative questions—such as "What evidence does the author use to support this point?", "What logical connection exists between these two facts?", "How might the outcome differ if this event had not occurred?", and "Which textual evidence validates your response?"—substantially invigorates reflective thinking.

Furthermore, task design must progress from single-answer queries to multi-modal and composite tasks requiring pupils to synthesize multiple data streams. For instance, tasks that provide a brief narrative passage accompanied by a data table and an infographic require students to simultaneously cross-process and harmonize multi-format information. Crucially, evidence-based reasoning serves as the hallmark of analytical maturity: if a pupil provides an accurate response but cannot substantiate the underlying rationale, the analytical competence remains incomplete. Regular integration of prompts such as "Why?", "Which fact confirms this?", "Find textual proof", and "Explain your reasoning" reinforces the indispensable bond between claims and evidentiary support.

Assessment must likewise transcend the evaluation of raw answers to appraise the underlying cognitive trajectory: how the pupil searched, filtered, compared, synthesized, and defended their assertions. Multilevel diagnostic assessments should span reproductive retrieval, productive relational correlation, and higher-order independent evaluative deduction. Interdisciplinary integration—spanning text analysis in native language and reading literacy, empirical deduction in natural sciences, visual chart interpretation in mathematics, and ethical situation assessments in social development classes—ensures that information analysis is mastered not as an isolated subject drill, but as a universal meta-cognitive learning competence.

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1. Essence and Concept of Information Analysis Competence

Working proficiently with information is an indispensable pillar of 21st-century educational systems. Today's student is viewed not as a passive recipient of prepackaged instructional content, but as an autonomous, self-directed agent who seeks out, perceives, compares, filters, analyzes, and innovates upon information gathered across diverse domains.

UNESCO conceptualizes Media and Information Literacy (MIL) as a composite set of competencies empowering individuals to engage critically and effectively with media and information landscapes—encompassing searching, critical evaluation, purposeful application, and ethical knowledge creation. In this theoretical light, information analysis competence can be defined as an integrated system of knowledge, skills, values, and cognitive practices enabling a learner to purposefully perceive data, grasp semantic depth, distinguish primary elements from extraneous details, trace logical interconnectivity, contrast diverse inputs, formulate evidence-supported inferences, and substantiate personal reasoning.

Within the primary school ecosystem, this competence assumes paramount importance. It marks the vital pedagogical turning point characterized by IEA PIRLS as transitioning from "learning to read" to "reading to learn"—empowering children to utilize literacy as a primary vehicle for autonomous knowledge acquisition.

2. Pedagogical Foundations of Information Analysis Competence

Pedagogically, forming information analysis competence demands actively immersing students in cognitive, inquiry-driven learning activities. Here, the instructor moves away from being a mere distributor of static information, operating instead as a strategic architect, facilitator, and coach of autonomous student inquiry. Key pedagogical paradigms include:

• **Competency-Based Approach:** Prioritizes the pragmatic operationalization of acquired knowledge within real-world and novel academic contexts over mechanical retention. It follows a structured trajectory: Knowledge ➔ Practical Skill ➔ Authentic Activity ➔ Independent Deductive Conclusion. For example, when exploring a nature text, students are guided beyond literal recitation to extract focal data, isolate vital facts, correlate variables, trace causal drivers, and articulate evidence-backed conclusions.

• **Activity-Oriented Approach:** Analytical acumen cannot be imparted passively; it is forged strictly through direct, hands-on intellectual labor. Classroom routines must consistently feature problem-posing questions, comparative matrices, exploratory "Why?" investigations, cause-and-effect mappings, text-to-table conversions, evidence hunts, and synthetic conclusion writing.

• **Problem-Based Learning (PBL):** Substitutes direct answers with meaningful dilemmas that mandate independent investigation. For instance, addressing the dilemma "Why is freshwater conservation imperative in specific geographical zones?" prompts students to examine parallel texts, hydrological charts, and regional photographs, deciphering underlying environmental causes and justifying balanced solutions.

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3. Psychological Foundations of Information Analysis Competence

Cultivating analytical competence in early learners requires close alignment with developmental neuropsychology and cognitive developmental stages. During the primary school years (ages 7–11), core cognitive functions—perception, voluntary attention, memory retention and retrieval, mental representation, dialectical thinking, verbal articulation, and logical reasoning—undergo intense structural transformation. Tasks must adhere strictly to the cognitive principle of progressive difficulty ("from simple to complex"):

• **Perception (Idrok):** Learners encounter information initially through sensory-perceptual observation. In early phases, tasks anchored in visual illustrations, concise narratives, and intuitive charts are most effective. Simple descriptive inquiries ("What do you observe in the picture?") are gradually transformed into relational inquiries ("How does the visual evidence corroborate or contrast with the text?").

• **Voluntary Attention (Diqqat):** Rigorous analysis necessitates selective cognitive filtering. Targeted attentional exercises (such as "Extract three core arguments regarding water conservation from the text") transition students away from passive, mechanical reading toward goal-oriented scanning and deep semantic extraction.

• **Working and Long-Term Memory (Xotira):** Analysis depends on cognitive retention and relational retrieval. Students must hold preceding textual concepts in working memory while interpreting subsequent disclosures, identifying overarching coherence ("How does the opening statement correlate with the final outcome?").

• **Higher-Order Thinking Operations (Tafakkur):** Thinking constitutes the operational core of analytical competence, characterized by the sequential chain: Comparison ➔ Generalization ➔ Analysis ➔ Synthesis ➔ Conclusion. By contrasting two phenomena, isolating distinctive markers, and integrating unified trends, students construct valid intellectual judgments.

4. Didactic Foundations and Core Principles

From a didactic standpoint, developing information analysis competence necessitates a scientifically structured system of instructional materials, scaffolded learning progressions, and methodologically validated principles:

1. Systematicity and Continuity: Analytical tasks must not be isolated exercises; they require continuous curricular integration across an iterative five-stage progression: Stage 1: Information Retrieval ➔ Stage 2: Information Isolation/Filtering ➔ Stage 3: Comparative Analysis ➔ Stage 4: Logical Interconnection ➔ Stage 5: Evaluative Conclusion.

2. Graduated Cognitive Progression (Simple-to-Complex): Initial early-grade exercises focus on explicit retrieval ("Locate the protagonist's name in the paragraph"), progressing to inferential causation ("Identify the primary motive driving the protagonist's decision"), and

ultimately reaching evaluative synthesis ("Justify whether the character's resolution was ethical, citing specific textual evidence").

3. Multi-Modal Visual Clarity (Ko‘rgazmalilik): Expanding learning materials beyond uniform text to encompass pictorial diagrams, structured tables, visual schematics, maps, and infographics enhances students' capacity to interpret and harmonize disparate communicative modalities.

4. Learner Autonomy and Scaffolding (Mustaqillik): Teachers should avoid presenting ready-made answers, establishing instead heuristic questioning ladders: "What occurred?" ➔ "Why did it occur?" ➔ "Which evidence verifies this?" ➔ "What broader conclusion can be synthesized?"

5. Alignment with PIRLS International Assessment Frameworks

Aligning information analysis competencies with the International Association for the Evaluation of Educational Achievement (IEA) PIRLS framework provides an objective, internationally benchmarked foundation. PIRLS evaluates reading literacy across two comprehensive purposes—reading for literary experience and reading to acquire and use information—anchored in four foundational cognitive comprehension processes:

Information Analysis Learning Activity	Corresponding PIRLS Cognitive Process
Retrieving Information (Axborotni topish)	Focus on and retrieve explicitly stated information
Filtering Essential Data (Muhim ma’lumotni ajratish)	Extract targeted details and key facts
Determining Cause-Effect (Sabab-oqibatni aniqlash)	Make straightforward, direct inferences
Interconnecting Diverse Data (Turli ma’lumotlarni bog‘lash)	Interpret and integrate ideas and information
Critiquing Information (Axborotga munosabat bildirish)	Evaluate and critique content and textual elements
Evidence-Based Deductive Conclusion (Dalil asosida xulosa)	Higher-order reading comprehension & critical synthesis

Additionally, the successful transition of PIRLS 2021 to a comprehensive digital assessment platform (digitalPIRLS) demonstrates the urgency of digital reading literacy. In computerized formats, young pupils interact with web-like environments, embedded hyperlinks, multiple browser tabs, dynamic graphs, and interactive simulations. This development underscores that elementary information analysis competence must seamlessly incorporate digital information literacy.

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6. Synergies with UNESCO Media and Information Literacy (MIL)

In contemporary educational philosophy articulated by UNESCO, Media and Information Literacy (MIL) extends far beyond mechanical computer operation or basic digital tool handling. MIL encompasses searching for reliable information, source provenance verification, critically evaluating underlying intent, processing and organizing data, using knowledge ethically, and participating productively in knowledge generation.

UNESCO's updated Global Standards for Media and Information Literacy curricula account for modern informational challenges, including artificial intelligence ecosystems, digital citizenship, countering disinformation, algorithmic curation, influencer communication dynamics, and computational data biases. Instilling these foundational orientations in elementary education ensures that children perceive texts and digital resources with discerning analytical awareness rather than passive acceptance.

7. Structural Theoretical Model of Information Analysis Competence

To provide a systematic framework for classroom implementation and diagnostic evaluation, we propose an integrated structural model comprising four interrelated components:

• **1. Motivational Component:** Encompasses genuine intrinsic interest in exploring information, intrinsic curiosity, the habitual drive to pose probing questions, and enthusiasm for self-guided discovery.

• **2. Cognitive Component:** Involves deep semantic comprehension, identification of pivotal concepts, comparative reasoning, recognizing logical interrelations, and discerning systemic structures.

• **3. Operational Component:** The practical execution of procedural routines: information searching, filtering, categorizing, structuring, analyzing, and synthesizing findings into cohesive schemas.

• **4. Reflective Component:** Metacognitive self-regulation: verifying personal deductions, re-examining initial hypotheses, cross-referencing textual evidence, identifying reasoning fallacies, and refining conclusions.

These four components operate not in isolation, but as an integrated, dynamic pedagogical continuum driving genuine cognitive autonomy.

8. System of High-Impact Instructional Tasks

To translate these theoretical pillars into classroom practice, we suggest an actionable repertoire of targeted instructional tasks tailored for primary educators:

• **"Find the Information" (Axborotni top):** Locating explicit facts within a textual or multi-modal source to accurately answer targeted inquiry questions.

• **"Eliminate the Extraneous" (Ortiqchasini ajrat):** Identifying and weeding out extraneous or irrelevant details from a curated set of statements to focus squarely on core ideas.

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• **"Compare Dual Sources" (Ikki manbani taqqosla):** Cross-examining two texts, or pairing a narrative passage with a visual illustration/table, to establish commonalities and disparities.

• **"Trace the Causation" (Sababini top):** Investigating underlying causal drivers behind specific natural events, historical milestones, or narrative character actions.

• **"Present the Evidence" (Dalil keltir):** Explicitly justifying spoken or written responses with direct textual quotations, empirical statistics, or observable data.

• **"Synthesize Conclusions" (Xulosa qil):** Synthesizing disparate data points from multiple parts of a text into an original, coherent, and substantiated summary statement.

• **"Information Chain" (Ma'lumotlar zanjiri):** Sequentially constructing a logical pathway linking: Concrete Fact ➔ Root Cause ➔ Direct Consequence ➔ Final Deduction.

9. Scientific Synthesis and Methodological Integration

Synthesizing theoretical literature and international frameworks confirms that information analysis competence transcends conventional information literacy. It constitutes a holistic cognitive-operational architecture spanning data discovery, semantic interpretation, categorization, comparative reasoning, causal attribution, and evidence-supported deduction. As reflected in UNESCO's MIL framework and PIRLS cognitive benchmarks, structuring instruction across three integrated dimensions guarantees sustainable cognitive development:

➔ **Pedagogical Foundation:** Competency-based, activity-centered, and problem-oriented methodologies empowering students as active investigators;

➔ **Psychological Foundation:** Deliberate stimulation of perception, voluntary attention, memory retention, logical operations, and age-adapted cognitive growth;

➔ **Didactic Foundation:** Systematic continuity, progression from concrete to abstract, multi-modal visualization, and heuristic questioning ladders.

The cohesive integration of this triad establishes an enduring foundation for young learners to mindfully receive, deconstruct, validate, and articulate information with intellectual autonomy.

10. Conclusion

In conclusion, cultivating information analysis competence in primary school pupils stands as an essential prerequisite for successful learning and cognitive adaptability in the modern information society. This competence encompasses the entirety of a child's interaction with knowledge—from initial search and critical appraisal to classification, comparative analysis, contextual interconnection, and evidence-grounded inference.

By systematically aligning primary instruction with pedagogical, psychological, and didactic imperatives—reinforced by international standards such as PIRLS and UNESCO MIL—educators can effectively cultivate independent inquiry, logical deduction, and discerning critical faculties in elementary students. Consequently, classroom learning is transformed into an engaging discovery environment where pupils emerge not as passive consumers of factual

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information, but as proactive, reflective thinkers equipped to thrive in an ever-evolving knowledge landscape.

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