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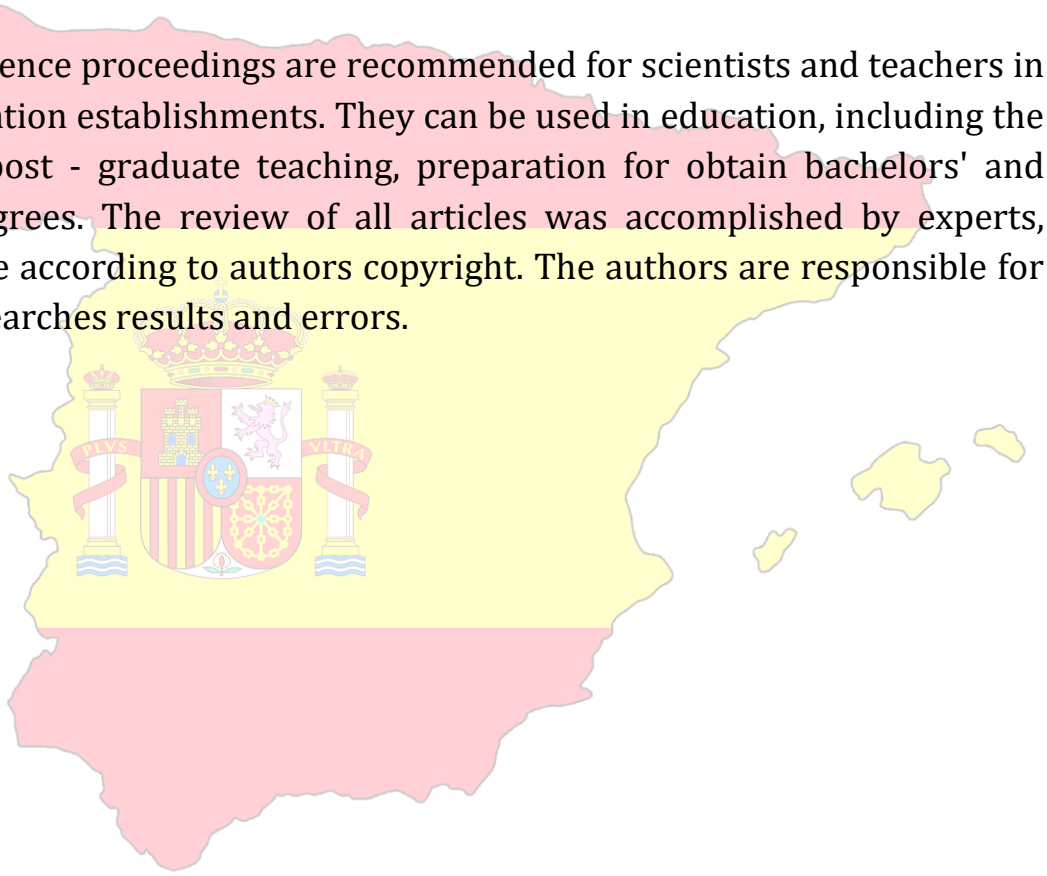

THE IMPORTANCE OF IMPROVING STUDENTS' SCIENTIFIC AND METHODOLOGICAL ACTIVITIES IN PRIMARY EDUCATION BASED ON PIRLS INTERNATIONAL RESEARCH

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Annotation: This article analyzes the improvement of students' scientific and methodological activities in primary education based on findings from the PIRLS (Progress in International Reading Literacy Study) international assessments. It highlights the significance of research-based teaching methods, literacy development, and pedagogical strategies for fostering cognitive, analytical, and reflective skills among young learners. The study emphasizes how insights from PIRLS can guide evidence-based practices for enhancing learning outcomes and methodological competencies in primary education.

Keywords: PIRLS; primary education; scientific-methodological activity; literacy development; evidence-based pedagogy; teaching strategies; international assessments; cognitive skills

The development of scientific and methodological activities in primary education is essential for fostering foundational cognitive, literacy, and problem-solving skills. International studies, particularly the Progress in International Reading Literacy Study (PIRLS), provide empirical evidence for effective pedagogical strategies in early schooling. PIRLS assesses the reading comprehension and literacy skills of fourth-grade students worldwide, offering insights into the factors that support or hinder the development of critical thinking, reflection, and scientific reasoning among young learners.

Analyzing PIRLS findings reveals that students' engagement in methodological activities is closely associated with their reading comprehension levels. Higher literacy skills correlate with better problem-solving ability, systematic thinking, and reflective learning practices. This indicates that methodological development in primary education is not separate from cognitive and literacy growth but is intrinsically linked to it. Educators can enhance students' scientific and methodological activity by integrating structured reading comprehension exercises with inquiry-based learning tasks.

In primary classrooms, scientific-methodological activity includes observing, questioning, investigating, interpreting information, and drawing evidence-based conclusions. PIRLS highlights that effective teaching practices involve interactive reading, discussion of texts, and opportunities for learners to explain, predict, and summarize ideas. By embedding these practices in

classroom routines, teachers can stimulate students' curiosity and analytical skills. Moreover, encouraging students to engage with informational texts and practical activities enables them to apply knowledge systematically, which strengthens their methodological competence.

PIRLS international data also emphasize the importance of differentiated instruction. Learners exhibit diverse reading abilities, cognitive strategies, and problem-solving approaches. Methodologically, teachers must design activities that accommodate individual differences while promoting collaborative inquiry. Group work, paired discussion, and guided experimentation allow students to observe multiple perspectives, hypothesize, and verify their conclusions collectively. Such approaches foster reflective thinking, which is a key component of scientific-methodological activity.

Evidence-based pedagogy, informed by PIRLS findings, encourages the integration of literacy and scientific inquiry. Activities such as text-based investigations, data interpretation exercises, and project-based tasks enable students to connect theoretical knowledge with practical problem-solving. These experiences cultivate students' ability to formulate research questions, plan experiments, analyze results, and communicate findings effectively. Consequently, primary students develop essential competencies for lifelong learning, including critical thinking, creativity, and autonomous problem-solving.

Furthermore, the PIRLS studies underline the significance of continuous assessment and feedback in promoting methodological activity. Formative assessments, reflective journals, and guided questioning allow teachers to monitor students' progress and provide timely support. Feedback not only addresses learning gaps but also motivates students to refine their reasoning and inquiry strategies. Incorporating assessment data into lesson planning ensures that teaching interventions are evidence-based, targeted, and effective.

Technological integration also plays a role in enhancing methodological activities in primary education. Digital texts, interactive learning platforms, and educational software provide opportunities for students to engage in virtual investigations, simulations, and collaborative knowledge construction. Using technology in conjunction with PIRLS-informed strategies supports individualized learning and promotes a deeper understanding of scientific concepts and procedures.

In conclusion, improving students' scientific and methodological activity in primary education requires a multifaceted approach guided by international evidence from PIRLS.

Effective strategies include promoting reading comprehension through inquiry-based and interactive methods, fostering reflective thinking and

collaborative problem-solving, differentiating instruction to meet diverse needs, integrating literacy with scientific inquiry, and employing technology and continuous assessment. By applying these principles, educators can enhance students' cognitive, analytical, and methodological competencies, preparing them for advanced learning and lifelong intellectual development.

One of the central findings from PIRLS studies is the role of teacher-mediated instructional strategies in promoting students' methodological competencies. Teachers who implement structured reading strategies, model inquiry processes, and facilitate guided discussions tend to cultivate higher levels of reflective thinking and analytical reasoning among their students. Methodologically, this emphasizes the need for professional development programs that equip teachers with evidence-based literacy and inquiry approaches.

Another key aspect highlighted by PIRLS is the integration of content across subject areas. For example, combining literacy tasks with science, mathematics, and social studies encourages students to use reading as a tool for inquiry and knowledge construction. This interdisciplinary approach not only strengthens comprehension but also develops students' ability to apply research methods and problem-solving techniques in diverse contexts. Such experiences are essential for fostering a scientific mindset and a methodical approach to learning.

The PIRLS framework also underscores the importance of formative feedback and scaffolding in primary education. Feedback mechanisms, such as prompting questions, guided reflections, and iterative exercises, support students' gradual mastery of research and analytical skills. Scaffolding ensures that even students with lower initial reading abilities can participate meaningfully in methodological tasks, promoting equity and inclusivity in the learning process.

Technology-mediated learning is another area where PIRLS findings provide valuable guidance. Digital tools, interactive texts, and learning management systems offer new possibilities for inquiry-based learning. Students can engage in virtual experiments, simulations, and collaborative online discussions that mirror real-life scientific investigation. Such practices support both literacy development and methodological skill acquisition, allowing learners to experience evidence-based reasoning in a controlled, interactive environment.

Finally, PIRLS highlights the significance of engaging students with authentic texts and real-world problems. When learners analyze informational texts, research environmental issues, or explore social phenomena, they practice collecting evidence, formulating hypotheses, and drawing conclusions. This strengthens their methodological thinking and helps develop habits of mind characteristic of skilled researchers. In primary

education, even simple projects such as class surveys, data collection, and problem-solving exercises provide meaningful opportunities for cultivating scientific-methodological activity.

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