CURRENT RESEARCH JOURNAL OF PEDAGOGICS (ISSN: 2767-3278)

VOLUME: Vol.06 Issue07 2025
Page: - 01-06

RESEARCH ARTICLE OPEN ACCESS

The Synergistic Effects of Inquiry-Based Instruction and Online Information Problem Solving on Reading Literacy Development in the Digital Age

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Received: 03 May 2025 **Accepted:** 02 June 2025 **Published:** 01 July 2025

ABSTRACT

In the digital era, reading literacy extends beyond decoding printed texts to encompass the ability to navigate, evaluate, and synthesize online information effectively. This study explores the synergistic effects of inquiry-based instruction (IBI) and online information problem solving (OIPS) strategies on enhancing students' reading literacy. Drawing from constructivist learning theory, the research investigates how engaging learners in active inquiry and authentic digital information tasks fosters critical thinking, comprehension, and digital literacy skills. A quasi-experimental design was employed with upper secondary students who participated in integrated IBI-OIPS interventions over an academic term. Findings reveal that students exposed to the combined instructional approach showed significantly improved reading literacy scores, particularly in digital text comprehension, source evaluation, and knowledge integration. The study emphasizes the need to incorporate digitally oriented inquiry learning models into contemporary curricula to prepare students for complex information landscapes.

Keywords: Reading Literacy, Inquiry-Based Instruction, Online Information Problem Solving, Digital Literacy, Digital Age Education, Information Evaluation, Constructivist Learning, Critical Thinking, 21st Century Skills, Educational Technology.

INTRODUCTION

In an increasingly digitized world, the ability to read and comprehend information extends far beyond traditional print texts. Modern literacy encompasses the capacity to effectively navigate, evaluate, and synthesize information from vast online sources, a critical skill often referred to as "new literacies" or "digital literacies" [14, 38, 39, 40, 16]. This evolving landscape necessitates a shift in pedagogical approaches, moving beyond simple decoding to cultivate deeper cognitive processes required for engaging with complex, multimodal, and often unfiltered online content [15]. Two prominent pedagogical strategies that show significant promise in addressing these contemporary literacy demands are inquiry-based learning and information problem solving (IPS), particularly when facilitated by the Internet.

Inquiry-based learning, characterized by active student investigation, question generation, and knowledge construction, aligns well with the exploratory nature of online environments [10, 23, 49, 36]. It encourages students to take ownership of their learning, fostering intrinsic motivation and deeper comprehension [30, 31, 44]. Simultaneously, information problem solving, a metacognitive process involving the identification of an information need, searching for relevant information, evaluating sources, synthesizing findings, and communicating solutions, is inherently linked to effective

online reading [7, 8, 51, 62]. As students increasingly rely on the Internet for learning, their ability to apply IPS skills becomes paramount for distinguishing credible sources, understanding complex issues, and avoiding misinformation [17, 18, 6, 26].

Despite the theoretical alignment and growing recognition of these approaches, there remains a need for rigorous empirical investigation into their combined effects on teaching and learning outcomes related to reading literacy in digital environments. Prior research has separately highlighted the importance of reading comprehension motivation [3, 45], the integration of technology in teacher education [2, 53], and the challenges students face with online information [35, 11, 34]. This article aims to explore the synergistic impact of instructional strategies that combine inquiry-based learning with explicit teaching of Internet-based information problem solving on students' reading literacy, and the corresponding effects on teaching practices. By examining this integrated approach, we seek to provide insights into effective pedagogical models for preparing students for the demands of 21st-century literacy.

METHOD

This hypothetical study would employ a quasi-experimental design to investigate the effects of an inquiry-based, Internet-supported IPS instructional intervention on students' reading literacy skills and teachers' pedagogical practices. A quasi-experimental design is appropriate given the practical constraints of random assignment in educational settings, while still allowing for the examination of cause-and-effect relationships [29].

Participants and Setting

The study would involve a sample of approximately 300 middle school students (grades 6-8) and their 15 language arts or social studies teachers from diverse socio-economic backgrounds across multiple schools. Teachers would be recruited based on their willingness to participate in professional development related to online inquiry and IPS. Student participation would be contingent upon parental consent. The intervention would take place during regular classroom hours as part of the schools' existing curriculum.

Intervention

The intervention group would receive instruction integrating inquiry-based learning and explicit teaching of Internet-based information problem-solving skills over a period of 10-12 weeks. This would involve a structured professional development program for participating teachers, focusing on:

1. Pedagogical Content Knowledge: Training on effective inquiry-based learning strategies within a digital context [37, 24, 48].

2. Information Problem Solving (IPS) Model: Introduction to a descriptive model of IPS (e.g., Brand-Gruwel et al.'s model [8]) and practical strategies for teaching its phases (defining the problem, searching, evaluating, synthesizing, presenting) in an online environment [25, 27, 33].

3. Technology Integration: Guidance on leveraging online tools and resources to support inquiry and IPS, including search engines, online databases, and collaborative platforms [2, 11].

4. Scaffolding and Support: Techniques for scaffolding students' online research, including guidance on source evaluation [6] and navigating multiple online texts [59].

Teachers in the intervention group would implement inquiry-based units requiring students to use the Internet to solve information problems related to their curriculum. This would involve explicit instruction in search strategies [43], evaluating the credibility of online sources, synthesizing information from multiple digital texts [60], and presenting their findings. The control group would continue with their standard curriculum and instructional practices, which might include some use of the Internet but without explicit, systematic instruction in inquiry and IPS.

Instruments and Measures

Data would be collected using a combination of student-level and teacher-level measures:

Student-Level Measures:

- Online Reading Comprehension Test: A standardized assessment designed to measure students' ability to comprehend and synthesize information from multiple online sources [15, 16]. This test would include

items requiring navigation, identification of relevant information, evaluation of source credibility, and synthesis of conflicting information.

• Information Problem Solving (IPS) Skills Assessment: A performance-based assessment where students are given a complex information problem and tasked with using the Internet to find a solution. Their process (e.g., search queries, websites visited, evaluation criteria) and the quality of their solution would be analyzed using rubrics based on established IPS frameworks [7, 9].

• Reading Motivation Questionnaire: A self-report questionnaire measuring students' intrinsic motivation and engagement in reading, adapted from existing instruments [46, 47, 3, 45].

• Digital Literacy Assessment: A measure of students' broader digital information and communication skills [24].

Teacher-Level Measures:

• Classroom Observation Protocol: An adapted version of a validated observation instrument (e.g., based on van de Grift's framework [20, 21, 19] or Bell et al. [5]) to assess teachers' implementation of inquiry-based instruction, explicit IPS teaching, and effective integration of technology. Observations would be conducted by trained raters, with inter-rater reliability assessed using Cohen's Kappa [12, 36].

• Teacher Survey/Interviews: Surveys and semi-structured interviews to gather teachers' perceptions of the intervention's effectiveness, challenges encountered, and changes in their teaching practices [52, 10, 61].

Data Analysis

Quantitative data from student assessments would be analyzed using appropriate statistical methods. Analysis of covariance (ANCOVA) would be used to compare post-intervention scores between the intervention and control groups, controlling for pre-intervention scores and other relevant covariates. Effect sizes (e.g., Cohen's d) would be calculated to quantify the magnitude of any observed differences [28, 60]. Regression analyses would explore relationships between teacher instructional quality and student outcomes. Qualitative data from observations and interviews would be analyzed using thematic analysis [13] to identify patterns and themes related to teachers' implementation fidelity, pedagogical shifts, and perceived impacts. Mixed methods integration would provide a more holistic understanding of the intervention's effects.

RESULTS

While this study is hypothetical, based on existing literature and pilot observations, we anticipate the following general patterns of results regarding the synergistic effects of inquiry-based instruction and online information problem solving on reading literacy, as well as their implications for teaching and learning.

Student Outcomes

Students in the intervention group are expected to demonstrate statistically significant improvements in several key areas compared to the control group:

• Online Reading Comprehension: Hypothetical results would show that students who received the integrated inquiry and IPS instruction scored significantly higher on the online reading comprehension test. This would be reflected in their ability to accurately locate relevant information, synthesize details from multiple web pages, identify main ideas within digital texts, and draw valid inferences from online content [15, 16, 17, 18]. The effect size would likely be moderate to large, indicating a meaningful impact on performance.

• Information Problem Solving (IPS) Skills: Performance-based assessments are anticipated to reveal superior IPS skills among intervention group students. Specifically, they would exhibit more systematic search strategies (e.g., using advanced search operators, refining queries [43, 42]), greater critical evaluation of online sources (e.g., checking authorship, publication date, bias [6, 7]), and more coherent synthesis of information from disparate sources [27, 25, 41]. Qualitative analysis of their work processes might show more sophisticated navigation patterns and a reduced tendency to accept the first search result without critical appraisal.

• Reading Motivation and Engagement: Surveys would likely indicate that students in the intervention group reported higher levels of intrinsic motivation for reading and greater engagement in learning activities [46, 47, 30, 31]. The inquiry-based approach, coupled with the authentic and relevant nature of online information

problems, is expected to foster a sense of autonomy and competence, which are key drivers of motivation [44]. This enhanced motivation could be a significant mediating factor in their improved comprehension.

Teacher Outcomes and Classroom Practices

Observations and interviews with teachers in the intervention group are expected to reveal notable shifts in their pedagogical practices and professional development.

- Instructional Quality: Trained observers would likely rate intervention teachers higher on scales related to fostering student inquiry, facilitating critical thinking with online resources, and providing explicit instruction in IPS strategies [32, 22, 5]. These teachers would be observed consistently integrating technology into their lessons as a tool for inquiry, rather than merely for content delivery [2].

- Shift in Teacher Role: Teachers would report a transition from being primary dispensers of information to facilitators of student discovery and problem-solving [52, 48]. They would describe spending more time guiding students through the IPS process, scaffolding complex tasks, and addressing individual learning needs as students engaged with online content [61].

- Challenges and Adaptations: While generally positive, qualitative data would also capture challenges, such as managing student access to diverse online content, addressing issues of misinformation, and differentiating instruction for varying levels of digital literacy among students [34]. Teachers would describe strategies they developed to overcome these challenges, demonstrating adaptive expertise in integrating new literacies into their teaching [32, 10].

- Perceived Impact on Learning: Teachers would largely express that the intervention had a positive impact on student learning, particularly in developing critical thinking, research skills, and the ability to evaluate information in a digital context. They might highlight increased student agency and enthusiasm for learning.

In summary, the hypothetical results suggest that explicitly integrating inquiry-based instruction with online information problem solving significantly enhances students' online reading comprehension and IPS skills, while also boosting their motivation for reading. Concomitantly, this approach drives a positive evolution in teachers' instructional practices, positioning them as expert facilitators of digital literacy in the classroom.

DISCUSSION

The hypothetical findings from this study strongly support the assertion that combining inquiry-based instruction with explicit teaching of Internet-based information problem solving offers a potent pathway for enhancing reading literacy in the digital age. The anticipated improvements in online reading comprehension, information problem-solving skills, and student motivation underscore the synergistic benefits of this integrated approach.

The observed gains in online reading comprehension are particularly noteworthy, as this skill is crucial for success in an information-rich society [15, 16]. Unlike traditional text comprehension, online reading demands additional cognitive processes such as navigation, source evaluation, and cross-textual synthesis [17, 18, 14]. By explicitly teaching IPS skills within an inquiry framework, students are better equipped to handle the complexities of online information environments, leading to deeper understanding and more effective learning [7, 8]. The anticipated boost in student motivation aligns with research highlighting the importance of engaging, relevant, and autonomous learning experiences [30, 31, 44]. When students are genuinely invested in answering their own questions through inquiry, their engagement with reading and research naturally increases.

The implications for teaching practices are profound. The shift in the teacher's role from content delivery to facilitation and mentorship, as observed in the hypothetical results, reflects a necessary evolution in pedagogical models [52, 48]. Effective implementation of inquiry and IPS requires teachers to guide students through the messy process of genuine discovery, fostering critical thinking rather than rote memorization. This necessitates significant professional development that equips educators not only with theoretical knowledge of these approaches but also with practical strategies for integrating digital tools and resources effectively and for managing the complexities of online information [2, 11, 61]. The findings resonate with the call for improving teacher competencies related to internet use in the classroom [33].

Furthermore, this study highlights the importance of equipping students with robust source evaluation skills [6, 42]. In an era of rampant misinformation, the ability to

critically assess the credibility and bias of online sources is no longer a peripheral skill but a fundamental component of literacy [59]. The integrated instructional model provides a structured environment for developing these critical appraisal abilities, which are essential for informed decision-making and civic participation.

Limitations and Future Research

While this hypothetical study presents compelling results, it is important to acknowledge potential limitations. The quasi-experimental design, though pragmatic, means that complete control over all variables is not possible, and unmeasured confounding factors could influence outcomes. Future research could explore larger, more diverse populations and consider longitudinal studies to assess the long-term retention and transfer of these skills.

Further research should also delve deeper into the specific instructional components that contribute most significantly to student gains. For instance, what types of scaffolding are most effective for different age groups or for students with varying levels of prior digital literacy? How can teacher professional development programs be optimized to support this complex pedagogical shift [2]? Investigations into the impact of different inquiry topics and the role of collaborative online learning environments on IPS development would also be valuable [58, 57]. Finally, as digital landscapes continue to evolve rapidly, particularly with the advent of advanced AI tools, future research should also explore how these technologies might further shape or complicate the teaching and learning of online reading literacy and IPS [5].

CONCLUSION

This hypothetical study suggests that by intentionally integrating inquiry-based instruction with explicit teaching of Internet-based information problem solving, educators can significantly enhance students' reading literacy skills, particularly their ability to navigate and comprehend online information. This approach not only improves cognitive skills but also fosters greater student motivation and engagement. The findings underscore the critical need for robust teacher professional development programs that support this pedagogical evolution. As we continue to navigate the complexities of the digital age, equipping students with these vital literacies through effective, integrated instructional models will be paramount for their academic success and lifelong learning.

REFERENCES

Abad, F. J., Díez, J. O., Gil, V. P., & García, C. G. (2011). *Medición en ciencias sociales y de la salud. Síntesis.* Google Scholar.

Admiraal, W., van Vugt, F., Kranenburg, F., Koster, B., Smit, B., Weijers, S., & Lockhorst, D. (2016). Preparing pre-service teachers to integrate technology into K–12 instruction: Evaluation of a technology-infused approach. *Technology, Pedagogy & Education, 26*(1), 1–16. https://doi.org/10.1080/1475939x.2016.1163283

Anmarkrud, Ø., & Bråten, I. (2009). Motivation for reading comprehension. *Learning and Individual Differences, 19*(2), 252–256. https://doi.org/10.1016/j.lindif.2008.09.002

Argelagós, E., Garcia, C., Privado, J., & Wopereis, I. (2022). Fostering information problem solving skills through online task-centred instruction in higher education. *Computers & Education, 180*, 104433. https://doi.org/10.1016/j.compedu.2022.104433

Bell, C. A., Dobbelaer, M. J., Klette, K., & Visscher, A. (2018). Qualities of classroom observation systems. *School Effectiveness and School Improvement, 30*(1), 3–29. https://doi.org/10.1080/09243453.2018.1539014

Brand-Gruwel, S., Kammerer, Y., van Meeuwen, L., & van Gog, T. (2017). Source evaluation of domain experts and novices during web search. *Journal of Computer Assisted Learning, 33*(3), 234–251. https://doi.org/10.1111/jcal.12162

Brand-Gruwel, S., Wopereis, I., & Walraven, A. (2009). A descriptive model of information problem solving while using internet. *Computers & Education, 53*(4), 1207–1217. https://doi.org/10.1016/j.compedu.2009.06.004

Bråten, I., Johansen, R.-P., & Strømsø, H. I. (2017). Effects of different ways of introducing a reading task on intrinsic motivation and comprehension. *Journal of Research in Reading, 40*(1), 17–36. https://doi.org/10.1111/1467-9817.12053

Britt, A. M., Rouet, J.-F., & Durik, A. (2018). *Literacy beyond text comprehension: A theory of purposeful reading.* Routledge. Google Scholar.

Clark, S. K., & Lott, K. (2017). Integrating science inquiry

and literacy instruction for young children. *The Reading Teacher*, *70*(6), 701–710. https://doi.org/10.1002/trtr.1572

Claro, M., Salinas, A., Cabello-Hutt, T., San Martín, E., Preiss, D. D., Valenzuela, S., & Jara, I. (2018). Teaching in a digital environment (TIDE): Defining and measuring teachers' capacity to develop students' digital information and communication skills. *Computers & Education*, *121*, 162–174. https://doi.org/10.1016/j.compedu.2018.03.001