Improving the Methodology for Developing Information Competence of Future Primary School Teachers in The Context of Digital Education

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Abstract: The rapid digitalization of education necessitates a fresh look at teacher training programs, especially with regard to enhancing information competence among future primary school teachers. This article examines the current challenges in teacher education related to the integration of digital tools into pedagogical practice and offers methodological insights on the development of information competence. The research focuses on how different teaching strategies and digital resources can be implemented to foster information-searching and problem-solving skills. The study employed an experimental methodology with a control and experimental group, highlighting how structured exposure to digital resources strengthens future teachers' technology-based instructional approaches. The findings suggest that a refined methodology, emphasizing both theoretical foundations and hands-on activities, significantly improves the information competence of teacher candidates. The article concludes that a systematic integration of digital resources in teacher education programs positively impacts the pedagogical skills of future primary school teachers, thus contributing to a more dynamic and interactive learning environment for young students.

Introduction: The global expansion of information and communication technologies (ICT) has profoundly influenced contemporary education systems, prompting a re-examination of how teachers are prepared to meet the demands of a digital learning environment. In particular, future primary school teachers bear a fundamental responsibility for shaping the first formal educational experiences of young learners, making their competence in utilizing digital resources critical. Despite growing awareness of the importance of digital skills, the concept of "information competence" remains multifaceted, encompassing the ability to efficiently locate, evaluate, and integrate information from diverse sources into the teaching and learning process. This competence is vital for teachers who are expected not only to keep pace with technological advancements but also to seamlessly incorporate such tools into their instructional strategies.

Much of the existing literature on information competence in education highlights the need to integrate digital tools and strategies throughout teacher training programs. However, gaps persist in terms of how these tools should be introduced and contextualized to effectively meet the developmental needs of teacher candidates. In primary education, the importance of these skills is amplified because digital platforms can inspire learner engagement and facilitate differentiated instruction. Teacher candidates must be prepared to critically assess digital resources, adapt them to specific learning objectives, and ensure that their students cultivate essential digital literacy from an early stage.

This study addresses the methodological shortcomings in developing information competence, focusing on how to systematically integrate digital technologies within teacher education courses. The main hypothesis is that a refined methodology—one that incorporates

regular hands-on practice, reflective tasks, and continuous assessment—will substantially enhance the information competence of future primary school teachers. To examine this, the study conducts an experimental design based on a comprehensive framework that identifies critical competencies needed for the contemporary digital classroom.

This research was conducted following the IMRaD structure to ensure clarity and replicability. An experimental design was selected to evaluate the impact of a newly proposed methodology for developing information competence among future primary school teachers. Participants were recruited from undergraduate programs in teacher education at a mid-sized university. They were divided into two groups: a control group following a standard teacher training curriculum and an experimental group receiving additional intervention guided by the refined methodology.

The experimental group underwent a series of workshops and seminars focused on integrating digital resources into lesson planning and instructional delivery. These sessions included exposure to various learning management systems, interactive applications, and online content repositories. Another key component was reflective practice, wherein participants were instructed to document their experiences, note observed improvements in their teaching strategies, and identify challenges encountered. This reflective exercise aimed to promote self-assessment skills and to encourage the conscious application of theoretical knowledge in practical scenarios.

Data collection involved a combination of qualitative and quantitative methods. Quantitative data were gathered through pre- and post-intervention tests designed to measure gains in information-search skills, digital resource evaluation, and lesson planning. The test items included both multiple-choice and short-answer questions focusing on the capacity to discern reliable information sources and effectively incorporate digital materials into teaching. Qualitative data were collected via semi-structured interviews and reflective journals to explore the subjective experiences of participants in applying the new methodology. The interviews provided deeper insights into participants' perceptions, motivations, and perceived barriers to implementing digital tools in the classroom. This mixed-methods approach ensured a comprehensive understanding of how the refined methodology influenced teacher candidates' skill sets and attitudes towards digital education.

All participants were informed about the nature and purpose of the study, and ethical approval was obtained from the university's review board. In terms of data analysis, quantitative results were processed using descriptive and inferential statistics to determine if there were significant differences between control and experimental groups. Qualitative data underwent thematic coding, identifying key themes related to instructional design, digital resource management, and shifts in participants' perceptions of their professional roles. By merging both quantitative and qualitative findings, the research provides a nuanced perspective on the effectiveness of the proposed methodology and sheds light on how future improvements can be made to teacher training programs.

Analysis of the quantitative data indicated a statistically significant difference between the control and experimental groups on multiple dimensions of information competence. Participants in the experimental group demonstrated higher scores on tests related to identifying credible digital sources, curating and organizing classroom materials, and designing lessons that effectively integrated technology. These results confirm the initial hypothesis that systematically embedding digital competencies into a structured training program fosters marked improvement in information-searching abilities.

An important finding was the experimental group's better performance in critically evaluating the relevance and reliability of online sources. Pre-test scores for both groups were relatively low, underscoring the general challenge teacher candidates face in navigating a proliferating range of digital content. However, after the intervention, participants in the experimental group showed more refined filtering strategies, as evidenced by consistent selections of peer-reviewed content and credible educational websites during the post-test evaluations. Qualitative feedback corroborated these outcomes, with several participants recounting how guided practice and regular reflections enabled them to better scrutinize digital resources and adapt them to specific teaching objectives.

Another relevant discovery pertained to the application of digital resources in crafting interactive lesson plans. The experimental group not only showed greater creativity in lesson design but also exhibited deeper pedagogical reasoning for using particular digital tools. Many participants expressed that ongoing mentorship and the opportunity to observe best practices in digital integration boosted their confidence in orchestrating technology-driven activities for primary classrooms. Such activities ranged from interactive reading sessions to collaborative group projects using online platforms. By contrast, participants in the control group more

frequently reported uncertainty and limited use of digital tools, largely confining their applications to standard resources provided in the curriculum.

The interviews and reflective journals also revealed shifts in self-perception among the experimental group. Participants increasingly saw themselves as facilitators of learning who actively harness digital means to enrich the classroom environment. Though challenges such as limited device availability and uneven student digital skills persisted, the experimental group displayed higher resilience and adaptability in devising workarounds. Overall, the results suggest that the newly developed methodology for enhancing information competence can make a tangible difference in how future primary school teachers approach digital resources.

The findings of this study reinforce existing research, which posits that teacher candidates who receive a structured and explicit focus on digital competencies are better equipped to manage, evaluate, and utilize educational technologies. Notably, the improvement in critical evaluation skills among participants in the experimental group highlights the importance of embedding explicit instruction on differentiating credible from non-credible sources. While many teacher preparation programs assume this skill develops organically, the results here indicate a need for guided, systematic approaches.

The reflective practices encouraged in the experimental group proved especially valuable, suggesting that ongoing self-assessment and documentation help consolidate theoretical knowledge into tangible teaching strategies. This aligns with scholarly work emphasizing the transformative role of reflection in teacher professional development. By regularly engaging in reflective exercises, future teachers sharpen their ability to identify gaps in their understanding and seek targeted resources to fill those gaps.

Nevertheless, the study also underscores the persistent challenges in incorporating digital tools into educational practice. Limited infrastructure, internet connectivity issues, and insufficient support structures can dampen the initial enthusiasm of teacher candidates. Addressing these barriers requires institutional-level solutions and policy reforms that go beyond the scope of a single teacher education program. Additionally, while the methodology outlined here showed promise, its long-term impact would benefit from a longitudinal study tracking how these teachers continue to integrate digital resources once they enter professional practice.

An important consideration is the changing nature of technology itself. As digital tools and platforms evolve, educational methodologies must likewise remain flexible. The technology focus in this study may need to be updated or adapted to new platforms in future iterations of the training program. Keeping the curriculum current is vital to maintaining the relevance of information competence in real-world classroom settings.

Despite these limitations, the findings collectively indicate that explicit, hands-on, and reflective instruction in digital resource management can significantly bolster the information competence of teacher candidates. This enhanced competence not only helps them navigate the digital era but also enables them to serve as role models for digital literacy among their students. The research thus contributes to a growing body of literature advocating for a recalibration of teacher education to meet the demands of modern schooling environments.

CONCLUSION

This study demonstrates that a refined methodology aimed at improving information competence among future primary school teachers can lead to statistically significant and qualitatively meaningful gains in digital awareness, resource evaluation, and instructional design. By integrating targeted workshops, reflective exercises, and supportive mentorship, teacher candidates develop greater confidence and skill in leveraging technology as an effective pedagogical tool. The success of this approach highlights the need for teacher training programs to transcend passive integration of digital tools and instead cultivate a systematic, hands-on immersion in the digital pedagogical landscape.

Going forward, educational institutions should adopt a proactive stance, continually revisiting and refining their methodologies in tandem with technological innovations. To sustain the progress observed in this study, stakeholders must address broader infrastructural and policy-level constraints that impede widespread adoption of digital education strategies. Only through a concerted effort can teacher candidates fully harness the transformative power of technology in primary education, thereby laying a robust foundation for the next generation of digital natives.

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