Importance of Teacher Digital Literacy on the Impact of Student Outcomes

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Course Number: ETEC 5430

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12/10/2024

Abstract

This research paper examines the impact of improved digital literacy on the effectiveness of instructional design in creating engaging lessons for students. The study focuses on the author's personal journey of strengthening digital skills through targeted professional development and the implementation of a 4th-grade instructional project on making inferences. Using the ADDIE model, the research incorporates a systematic approach, including analysis, design, development, implementation, and evaluation phases, to create an interactive and gamified learning experience. Pre- and post-assessments reveal noticeable improvements in the author's digital proficiency and confidence in using various educational technologies, which directly contributed to the success of the instructional design process. Student feedback collected through surveys revealed high levels of engagement and positive learning outcomes, showing the effectiveness of the applied digital tools and strategies. The findings support the importance of digital literacy in improving instructional design practices and highlight the potential for improved student engagement and learning effectiveness. Future implications for professional skill development and innovative teaching methods are discussed, emphasizing the importance of preparing educators to meet the changing needs of contemporary education.

Literature Review

The importance of teacher digital literacy has become increasingly clear in the context of educational effectiveness and student engagement. Wu and Shi (2024) emphasize that teachers' digital competencies significantly impact their effectiveness in vocational undergraduate education. Their research suggests that when educators are proficient in digital tools, they can be more creative in their teaching methods and better use resources, ultimately leading to higher student engagement. This aligns with the goal of instructional design to enhance learning outcomes through well-crafted instructional materials and methods.

In addition to the foundational skills necessary for effective teaching, Záhorec et al. (2021) argue for integrating comprehensive digital literacy training into teacher education programs. Their study highlights the need for future educators to deepen their proficiency with both common tools like Microsoft Office and emerging applications such as Google Docs and ActivInspire. Revamping curricula to include these digital competencies allows instructional designers to prepare teachers to use technology in their lessons, thus making learning more interactive and accessible for students.

As technology continues to evolve, ongoing professional development in digital literacy is essential for educators. Krumsvik (2008) highlights the necessity for teachers to not only possess technical skills but also to understand how to integrate technology meaningfully into their instruction. This perspective reinforces the notion that digital literacy is not merely about knowing how to use tools, but also about understanding their impact on learning processes and outcomes. By improving their digital skills, educators can create more effective and engaging learning experiences that are essential in today's technology-driven educational landscape (Coker, 2020).

Methodology

This study used multiple methods to increase the author's digital literacy and apply these skills to an instructional design assignment, focusing on a 4th-grade group project lesson aimed at improving students' abilities in making inferences.

Improvement of Digital Literacy

To improve digital literacy, the author engaged in formal training and self-study with a variety of software and tools.

Training and Software Utilization

The author completed a paid introductory course in Adobe Illustrator to gain basic graphic design skills. After using a 90-day free trial, the author learned Articulate

360. This resulted in creating a short online course for the author's job at AMR that focused on the differences between levels of services for ambulances. The author improved presentation skills by creating slides with Canva and converting them into Google Slides, integrating visual design into lesson plans. The author learned to navigate Google Classroom effectively, creating an organized platform for assignment and resource management. Skills in website creation and editing were developed, enabling the author to present information in an engaging manner. Proficiency was gained in using educational tools such as Edpuzzle for assessments and Quizizz for interactive quizzes. Google Docs was used for creating surveys to gather feedback, and the author practiced data presentation by generating pie charts from the collected survey results. The author also learned video editing skills by using Videogen to create and edit instructional videos. The author increased the ability to form better prompts in AI tools such as ChatGPT and Claude.ai to create learning outcomes and objectives. The author also educated themselves on copyright guidelines relevant to images sourced from both purchased content and AI-generated materials to ensure ethical usage of the images and material. Finally, the author studied Universal Design for Learning (UDL) principles to better accommodate diverse learner needs and preferences in instructional design.

Lesson Design Process

The author applied newly acquired digital skills combined with the ADDIE instructional design model, which comprises five phases: Analysis, Design, Development, Implementation, and Evaluation to create a group instructional design project. Technology tools were used throughout each phase of the design process.

Data Collection

This study assessed the impact of improved digital literacy on instructional design capabilities through a structured pre- and post-assessment process, combined with an evaluation of student outcomes. The assessments measured changes in digital

skill proficiency before and after a semester of intensive instructional design training and application.

Pre-Assessment

The pre-assessment was administered to evaluate baseline digital skills across several areas critical to instructional design. The author responded to a series of general digital literacy questions, practical skills assessments, and scenario-based inquiries.

1. General Digital Literacy Questions: The author rated their comfort level with digital tools on a scale of 1 to 5. Initial responses showed a low comfort level (1) with digital tools for instructional design, limited experience with learning management systems (LMS), and a general lack of confidence in creating multimedia content (confidence rating of 2). Understanding of data privacy was similarly rated low (2).
2. Practical Skills Assessment: The author identified familiar digital tools, noting experience only with Microsoft PowerPoint, Canva, and Google Docs, while expressing no experience in creating digital assessments. This established a foundation for targeted learning and growth during the semester.

Post-Assessment

Following the semester, a post-assessment was administered to measure skill acquisition and overall progress in digital literacy and instructional design effectiveness.

1. General Digital Literacy Questions: The author showed substantial growth in comfort level, rating their proficiency at 3 on a scale of 5. They reported successful engagement with digital collaboration tools and a significant increase in their understanding of data privacy and copyright issues (rated 5).
2. Practical Skills Assessment: The author showed increased proficiency with a broader array of digital tools, with successful use of Articulate Storyline, Google Slides, Edpuzzle, and video editing software. Importantly, the author reported becoming very experienced in creating digital assessments, reflecting a notable enhancement in practical skills.

Student Outcomes

To evaluate the effectiveness of the instructional design project, an escape room lesson on making inferences was analyzed through student feedback and performance data. After completing the activity, students provided short answers to qualitative questions and rated their experiences using a four-point scale (poor, fair, good, excellent). Key feedback included:

- Engagement and participation levels were reported as high, with a strong overall positive impression of the escape room experience.
- Students expressed a desire for more interactivity and animations in the presentation materials.

The effectiveness of the lesson was quantitatively assessed through student performance on inference-making tasks. Data analysis revealed varying levels of student proficiency, with ten students achieving 100% accuracy, and an overall improvement noted in the class. A student performing at 60% accuracy showed a 40% improvement from the pre-assessment.

Results

The results illustrate a significant improvement in the author's digital literacy skills, which positively influenced the author's instructional design capabilities and enhanced student learning and engagement during the implementation of the 4th-grade lesson on making inferences.

Improvement in Digital Literacy Skills

The pre- and post-assessments clearly show a marked enhancement in the author's digital proficiency over the course of the semester. Key findings include:

Comfort and Confidence Levels

Initial self-assessments revealed a low comfort level with digital tools for instructional design, with a rating of 1 on a scale of 5. Post-assessment ratings improved to a 3, showing a transition toward a more confident and capable use of

digital resources. Similarly, confidence in creating multimedia content rose from a rating of 2 to 3, reflecting the successful application of skills gained throughout the semester.

Technological Proficiency

The author's engagement with a variety of educational tools expanded significantly. While pre-assessment responses showed limited experience with digital tools (primarily Microsoft PowerPoint), the post-assessment revealed proficiency in several new platforms, including Articulate Storyline, Edpuzzle, Google Slides, and Videogen. The ability to create assessments using digital tools transitioned to a self-reported status of "very experienced," underscoring the author's readiness to craft engaging educational assessments.

Understanding and Application of Copyright and UDL Principles

Prior to the semester, the author's understanding of data privacy and copyright guidelines was rated at 2. The post-assessment showed a complete understanding of these critical areas, rated as a 5, which is crucial for developing ethical and legally compliant instructional materials. The author successfully implemented Universal Design for Learning (UDL) principles into lesson design, enabling accommodation of diverse learning styles and enhancing accessibility, which is vital for effective teaching.

Impact on Student Learning and Engagement

The group project lesson on making inferences, facilitated during the implementation phase, yielded positive outcomes in terms of student engagement and learning.

Engagement Levels

Feedback collected from students after the escape room activity showed high levels of engagement. Students expressed enthusiasm about the gamified nature of the lesson, highlighting the interactivity and enjoyment aspects of the escape room. Most

students reported they found the activity captivating and would appreciate more gamified assignments in the future, suggesting that the approach effectively captured their interest.

Learning Outcomes

Performance data gathered from student assessments showcased notable improvements in inference-making skills. The analysis revealed that ten students achieved perfect scores, with others performing well, showing that the instructional activities effectively reinforced the learning objectives. Importantly, even students who initially scored lower showed significant improvement, with one student increasing their performance from 60% to 100% accuracy. This increase illustrates the effectiveness of the pedagogical strategies employed.

Feedback on Learning Experience

Qualitative responses from students highlighted specific strengths of the lesson, including collaboration, teamwork, creativity, and the meaningful application of concepts. Many responses showed that the interactive elements made learning about inferences enjoyable and memorable.

Discussion

This study aimed to examine the relationship between improved digital literacy and its impact on instructional design effectiveness, as well as student learning and engagement. The findings show a positive correlation between the enhancement of the author's digital skills and the successful implementation of a 4th-grade lesson focused on making inferences.

Reflection on Digital Literacy Improvement

The quantifiable advancements in the author's digital literacy—clear from pre- to post-assessment metrics—highlighted the transformative potential of targeted

professional development. Engaging with various tools such as Articulate Storyline, Edpuzzle, and Google Classroom, among others, not only bolstered the author's confidence but also enriched the author's instructional repertoire. The ability to integrate these tools seamlessly into lesson design exemplified how focused training can lead to practical educational applications.

The shift in the author's understanding of copyright, data privacy, and UDL principles marked a critical evolution in the author's approach to instructional design. By integrating teaching practices into ethical considerations and learner-centered strategies, the author created a more inclusive and effective learning environment.

Impact on Student Learning and Engagement

The results showed students engaged actively with the lesson, resonating well with the gamified approach implemented through the escape room format. The feedback received was overwhelmingly positive, showing that the shift towards a more interactive and collaborative learning experience successfully captivated student interest and fostered a sense of community in the classroom. This finding aligns with existing research that emphasizes the importance of engagement and interactivity in enhancing student learning outcomes.

The performance data further corroborated the effectiveness of the lesson design. Not only did many students achieve high accuracy in making inferences, but the significant progress of students who initially struggled suggests that the instructional methods employed were inclusive and accessible. This highlights the potential of integrating digital tools that promote collaborative and critical thinking skills, allowing diverse learners to thrive.

Implications for Future Practice

These findings underscore the necessity of ongoing professional development in digital literacy for educators. As technology continues to evolve and permeate

educational contexts, fostering digital competence will be essential for designing effective instructional strategies. This study advocates for structured training programs that equip educators with the skills to leverage technology in ways that enhance learning experiences.

The successful application of gamification principles in this study shows its effectiveness in engaging learners and should encourage further exploration of innovative pedagogical approaches. Future research could investigate the long-term impact of such strategies on student retention and the application of learned skills.

Limitations and Recommendations for Further Research

While this study provides valuable insights, it is essential to acknowledge several limitations. The findings are based on a single instructional design project within a specific context, which may not be generalizable across all educational settings. Future research should expand the scope to include diverse learning environments and student demographics. Longitudinal studies could provide deeper insights into the sustained impact of improved digital literacy on both educators and students.

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