Enhancing the Suchman Inquiry Model through Digital Education

Xiaomei Feng

Macao Polytechnic University, Macau, 999078, China

xiaomei.feng.phd@gmail.com

Abstract. This paper explores the enhancement of the Suchman Inquiry-Based Teaching Model through the integration of digital education. The article analyzes how digital tools can assist in the teaching steps of the Suchman Inquiry model to help develop students' inquiry skills and enhance their understanding of complex concepts. Educator training on digital literacy and instructional design is highlighted as essential for successful integration. Furthermore, a structured approach to instructional design is proposed, encompassing topic selection, inquiry procedures, data collection, hypothesis formulation, experiment design, and analysis. The findings emphasize the positive impact of inquiry-based learning combined with digital technology on student engagement, critical thinking, and problem-solving skills, promoting a shift toward a more interactive and autonomous learning environment.

Keywords: Digitization, Suchman Inquiry Model, Digital education, Digital learning

1 Introduction

The Suchman Inquiry Based Teaching Model is an educational philosophy rooted in the Socratic method, which emphasizes the enhancement of student thinking and understanding through questioning and dialogue. Developed by Richard Suchman in the 1960s, this model posits that individuals possess an innate curiosity for exploring unfamiliar phenomena and challenges [1]. The core idea is that students develop a deeper understanding through carefully structured inquiry and hypothesis testing, which fosters a healthy respect for the subject. This process also helps them recognize the limitations of their knowledge and assess its reliability. To capitalize on this intrinsic desire for inquiry, educators are encouraged to stimulate students' curiosity through guiding questions, which promotes active exploration and the discovery of knowledge rather than passive reception of information. This approach allows students to experience the scientific inquiry process, master inquiry methods, acquire knowledge, and develop independent learning skills. Additionally, the Suchman Inquiry Model aims to bridge the gap between academic learning and real-world problem solving, enabling students to investigate genuine issues and cultivate the skills necessary for synthesizing and

C. F. Peng et al. (eds.), *Proceedings of the 2026 5th International Conference on Humanities, Wisdom Education and Service Management (HWESM 2026)*, Advances in Social Science, Education and Humanities Research 1024,
https://doi.org/10.2991/978-2-38476-593-5_5

exploring knowledge like scientists [2]. Through this model, the guidance of educators and the active exploration by students converge to enhance their abilities for autonomous learning and problem solving. The Suchman Inquiry Model effectively bolsters students' rational thinking skills, encouraging them to move beyond trial-and-error techniques to formulate reasonable hypotheses. It fosters connections between new information and existing knowledge, enabling students to find solutions while cultivating perseverance. Throughout this process, students transition from seeking external rewards to experiencing intrinsic satisfaction, gaining a sense of accomplishment as they tackle challenges and resolve problems.

Compared to traditional educational methods, inquiry-based learning approaches have been demonstrated to be effective in previous studies. Abdi [3] discovered a significant difference in the achievement levels of students taught using traditional methods versus those instructed through inquiry-based approaches. Joshi and Ferro [4] found that there is a significant increase in the average scores of students taught using the inquiry training model compared to those instructed through traditional methods. Digital technology is an indispensable tool in supporting inquiry-based science education [5]. Its application in observation and data interpretation not only enhances students' data analysis skills but also promotes their practical understanding of scientific processes. Given the lack of exploration in existing literature regarding the integration of digital education in teaching methods, this paper presents an approach to applying digital education based on the Suchman Inquiry Model.

2 Preparation Phase

First, educators need to undergo training to understand the fundamental principles of the inquiry model, the implementation steps, and how to integrate it with digital education [6]. Second, this training should cover how to use various digital tools to support student learning and enhance educational effectiveness, such as platforms like Google Classroom, Zoom, Canva, and Padlet. Proficiency in the basic functions of these tools ensures that educators can effectively apply them in their teaching practices [7]. Finally, educators should develop a curriculum outline and plan based on educational objectives, clearly defining the focus of each inquiry stage. Starting with clear learning goals, they should then establish assessment methods and instructional activities, ensuring overall coherence and effectiveness in teaching. By enhancing educators' digital literacy and instructional design skills, they can better facilitate deep learning among students.

3 Steps for Digital Driven Learning in the Suchman Inquiry Model

3.1 Selecting a Topic

In the initial phase of the instructional design process, educators are tasked with selecting a context or problem that effectively captures student interest while presenting a

meaningful challenge. Suitable topics may include complex scientific dilemmas, ambiguous historical events, or suspenseful narratives in literature. It is imperative that the chosen subject matter remains relevant to the lives of students, as this relevance can evoke emotional resonance and stimulate curiosity. This foundational step is pivotal in establishing a framework for subsequent investigations, thereby enhancing students' logical reasoning, critical thinking, and creativity. To effectively implement this initial step, the following Digital Education Applications can be utilized.

- Education management systems: These platforms allow educators to assess individual student interests, progress, and capabilities. By analyzing these data points, educators can customize group-selected topics that resonate closely with students' personal experiences and concerns. This tailored approach not only promotes student motivation but also enhances overall engagement in the learning process.
- Open learning: Education management systems can generate customized open-ended questions based on the unique interests of each student [8]. Examples include inquiries such as, "What explanations can we propose for the emergence of various phenomena?" or "How can we substantiate the validity of experimental results?" These tailored questions cater to the diverse thinking styles and needs of individual students, encouraging a deeper exploration of their inquiries.

3.2 Explaining the Inquiry Procedures and Rules

Educators must first provide a comprehensive overview of the inquiry steps and rules to clarify the objectives and methods at each stage for students. This includes introducing fundamental guidelines, respecting and listening to others' viewpoints, maintaining an open mindset, and actively posing questions. Ensuring that students understand their roles in the inquiry process is essential. Following this, educators should clearly present the chosen topic or problem context. This can be achieved through visual aids, written descriptions, and brief discussions that guide students in identifying the key elements of the issue at hand. The aim of this phase is to foster active student participation and deepen their understanding of the problem, establishing a foundation for future inquiry activities.

- Student customized learning: Students can learn at their own pace without being constrained by the traditional classroom rhythm, which enhances learning outcomes.
- Education management system: Educators should employ visual materials (e.g., charts, videos) and written descriptions provided by the system to assist students in grasping the essential elements and research steps of the selected topic. Students may be allowed to choose a question related to their personal interests, thereby increasing their sense of engagement.

3.3 Data Collection

Students begin by extensively gathering relevant information based on the questions they have formulated. They can utilize a variety of sources, including libraries, online

databases, and scientific journals, to enhance their understanding of the problem at hand. During this process, students are encouraged to ask questions to clarify any uncertainties, with educators responding affirmatively or negatively to promote independent thinking. This approach aids in their deeper understanding of the issue and enhances their self-directed learning capabilities.

- Student customized learning: Educators can provide a range of learning resources and methods tailored to the varied needs of students. For instance, materials such as videos, experiments, or reading assignments can be offered to those interested in science, while literature enthusiasts might choose relevant novels or plays. This ensures that each student can engage in learning through the approach that best suits them.

3.4 Formulating Hypotheses and Developing Theories

Students are tasked with formulating reasonable hypotheses based on their observations. These hypotheses should be testable, logical, and data-supported to provide a solid foundation for subsequent experimental designs. This process encourages students to engage in logical reasoning and to develop preliminary explanations for the phenomena under investigation, thereby offering direction for further exploration. When students present theoretical hypotheses, the educator should refrain from asking additional questions and instead document the hypothesis on the board. A class-wide examination and discussion should be organized to determine the validity of the theory. During this phase, students are encouraged to verify the effectiveness of their theories through experimentation or by consulting additional resources.

- Student customized learning: AI-driven adaptive platforms can provide personalized feedback based on each student's learning pace and ability, assisting them in testing and refining their hypotheses. This personalized feedback can enhance students' confidence in the hypotheses they propose, thereby motivating them to continue their exploration and argumentation.
- Education management system: Educators should prompt students to validate their proposed theories through experiments or by researching external materials. This process not only supports students' self-directed learning but also aids them in forming evidence-based viewpoints backed by empirical data [9]. Moreover, AI tools can recommend relevant literature or datasets, making it easier for students to find information pertinent to their theoretical hypotheses.

3.5 Designing Experiments

Students are required to design experiments to validate their hypotheses. During this design process, they must clarify the experimental objectives and formulate a detailed experimental plan, encompassing the necessary materials, procedural steps, and methods for data collection. While conducting experiments, students must observe

attentively and record data meticulously to ensure the accuracy and reliability of their results, thereby enhancing their scientific methodology and logical reasoning skills.

- Open learning: Students can upload personal works, such as stories, images, or videos, on digital platforms to share their experiences and insights, fostering a sense of community and belonging. Educators can leverage social media and online learning platforms (e.g., Khan Academy and MOOCs) to create more open learning opportunities for students, guiding them in broader knowledge exploration.
- Collaborative open learning: Students and mentors from various disciplines should be encouraged to collaboratively engage in open learning projects. This cross-disciplinary cooperation can stimulate greater creativity and innovation.

3.6 Data analysis and Inquiry Process Evaluation

Upon completing the experiments, students are required to analyze the results obtained or the collected data, comparing the actual outcomes with the expected hypotheses to assess the validity of the hypotheses. This process not only aids students in understanding the significance of the data but also enables them to determine whether the hypotheses hold true. Educators and students collectively engage in discussions regarding the inquiry process they experienced, analyzing how theories were formed to explain the proposed questions. They reflect on the challenges and successes encountered during the process and discuss potential improvements to the inquiry methodologies, thereby enhancing students' inquiry skills and cognitive abilities.

- Education management system: When students propose theoretical hypotheses, the system should document these in the appropriate section and facilitate group discussions. This helps students comprehend the logical relationships and scientific foundations among different hypotheses and allows the system to provide instant analytical feedback, improvement suggestions, and encouragement to bolster student confidence.
- Open learning: Educators should encourage students to independently design experiments and projects, which contributes to cultivating their innovative skills. This sharing extends beyond experts in the educational field, allowing students or community members from diverse backgrounds to contribute, thereby stimulating creativity and a willingness to innovate.
- Digital education functions as an input-output system: Schools, functioning as input-output systems, should ensure that input data encompasses various sources. This includes student data such as personal information, academic records, online activity, and behavioral analyses, which can be gathered using Learning Management Systems (LMS) and observational techniques. Additionally, educator data should include qualifications and performance metrics collected through assessments and training programs. Furthermore, curriculum and content input should consist of digital learning materials and interactive modules to provide a dynamic learning experience.

3.7 Final Reflections and Reporting

In the final phase of inquiry-based education, students draw conclusions based on the results of their data analysis and engage in discussions and reflections regarding potential improvements to their experimental methods or the formulation of further questions to enhance critical thinking skills. During this process, students are required to write a detailed report documenting their inquiry journey, including the research background, experimental design, data analysis, and final conclusions. Subsequently, students share their findings and conclusions with their peers or the entire class, fostering knowledge exchange and collaborative learning, while encouraging the clash of differing perspectives and enhancing the collective learning environment. Finally, educators encourage students to apply the inquiry skills they have acquired in other contexts, enhancing their problem-solving capabilities.

- Digital education functions as an input-output system: The effectiveness of educational practices is reflected in various output measures, including student performance indicators such as grades and graduation rates. AI-driven platforms effectively promote student learning by offering personalized experiences tailored to individual needs. Furthermore, the introduction of automated grading and feedback systems that leverage natural language processing technology provides immediate insights, alleviating educators' workloads and enhancing communication with parents, ultimately fostering a supportive educational network.
- Forecasting education: Predictive analytics can be utilized to evaluate students' past performance, offering early warnings for potential future challenges. These timely intervention mechanisms help ensure a smoother learning experience for students. Additionally, educators can leverage this data to personalize and adjust their instructional strategies, effectively addressing individual learning needs.
- Automated grading system: Automated grading systems can assess students' assignments, lab reports, and discussion contributions in real time, providing rapid feedback that enables students to quickly understand their learning progress and performance. This immediate feedback facilitates targeted improvements and allows students to receive results almost right after submitting their work, thereby reducing wait times and enhancing the interactivity of their learning experiences.
- Self-reflection through automated grading: Students can engage in self-reflection using feedback from automated grading systems, enabling them to identify areas of strong comprehension as well as aspects that require further development. The system also offers personalized recommendations to help students concentrate on their weaker areas. Meanwhile, educators can analyze data from these automated systems to gain a comprehensive overview of the class's overall learning performance, allowing them to make informed adjustments to their teaching strategies and content.

4 Conclusion

The integration of digital education into the Suchman Inquiry-Based Teaching Model significantly augments its effectiveness in fostering student engagement and critical

thinking. This model enhances the learning experience by promoting an inquiry-driven approach supported by digital tools that facilitate communication and collaboration. Through structured training, educators can effectively guide students in their exploration of complex topics, encouraging them to formulate hypotheses and engage in meaningful scientific inquiry. This teaching method, integrating digital education, enables students not only to develop a stronger understanding of the subject matter but also to cultivate vital skills for lifelong learning, such as perseverance, autonomy, and collaborative problem-solving. Future educational practices should prioritize the continuous adaptation of digital resources and methodologies to further enhance inquiry-based learning, fostering a generative learning environment where students can thrive and apply their skills across diverse contexts.

References

1. Suchman, J. R. Inquiry training: Building skills for autonomous discovery. Merrill-Palmer Quarterly of Behavior and Development 7, 147–169 **1961**.
2. SUCHMAN, J. A MODEL FOR THE ANALYSIS OF INQUIRY Academic Press, **1966**.
3. Abdi, A. The effect of inquiry-based learning method on students' academic achievement in science course. Universal Journal of Educational Research 37–41 **2014**.
4. Joshi, K. H. & Ferro, D. J. K. A study of the effect of inquiry training model in chemistry subject. A Global Journal of Humanities VII **2024**.
5. Yun, M. & Crippen, K. The use of educational technology in inquiry-based elementary science education: a systematic review. International Journal of Science Education 46, 1–24 **2023**.
6. Kamarudin, M. Z. & Noor, M. S. A. M. Teacher's practice in digital inquiry-based science learning in a primary school. Journal of Science of Learning and Innovations 1 **2024**.
7. Kapici, H. O. & Akcay, H. Improving student teachers' TPACK self-efficacy through lesson planning practice in the virtual platform. Educational Studies 49, 76–98 **2023**.
8. Muhamad Dah, N., Mat Noor, M. S. A., Kamarudin, M. Z. & Syed Abdul Azziz, S. S. The impacts of open inquiry on students' learning in science: A systematic literature review. Educational Research Review 43, 100601 **2024**.
9. Halkiopoulos, C. & Gkintoni, E. Leveraging AI in e-learning: Personalized learning and adaptive assessment through cognitive neuropsychology—a systematic analysis. Electronics 13 **2024**.