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The Development of A Digital Comic Themed 'In the Hospital' Assisted by the Gemini Application

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Abstract. The demand for nursing professionals in Germany is increasing, making the mastery of medical German highly essential. However, learning media that specifically present clinical dialogues in hospitals are still limited. This study aims to develop and describe the creation process of an interactive German digital comic themed "Im Krankenhaus" using the generative AI application Gemini. The method used is Research and Development (R&D) based on the Richey and Klein model, which includes planning, creation, and evaluation phases. During the process, Gemini was used to construct dialogue scripts and generate visual illustrations, Canva was utilized for layout design, and FlipHTML5 was used to publish the interactive comic. The results show that the main obstacle of AI, which is visual inconsistency, can be resolved using the image to image prompting technique. Upon validation, the product received a score of 90% from the material expert, with a note to adjust the language level from A2 to B1/B2 to meet medical communication standards, and 95% from the media expert. Overall, the comic is categorized as highly feasible. The implication is that generative AI significantly accelerates the production of functional learning media relevant to the communication needs of nursing students, although the human role remains crucial as the final decision maker.

Keywords: Artificial intelligence; Design and development; Digital comic; German for nursing; Interactive media.

1. INTRODUCTION

The nursing shortage in Germany is projected to worsen, reaching a deficit of hundreds of thousands in the coming decades, which automatically opens vast career opportunities for healthcare professionals from various countries. Consequently, these opportunities demand strong communication competencies, particularly the mastery of medical German. In a hospital environment, language is not merely an everyday communication tool but a vital instrument for executing clinical procedures safely and accurately ranging from taking patient history *(anamnesis)* and providing care instructions to conducting shift handovers among staff (Klarmann, Fischer, & Weiß, 2024). Therefore, curriculum standards require language learners to achieve at least a B1 proficiency level to ensure they fully comprehend and can appropriately respond to these real life communication scenarios (Goethe Institut, 2020).

Unfortunately, foreign language learning in the classroom is often limited to grammar memorization and fails to provide a comprehensive picture of how these interactions are practiced in the professional world. This issue aligns with the results of a preliminary survey conducted among students of the German Language Education Study Program, who expressed a strong need for practical visual learning media that accurately reflect the hospital context. To address this concern, digital comics emerge as a highly potential alternative learning medium. By combining dialogue texts, facial expressions, and specific settings, digital comics can bring

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clinical communication to life, making it much more vivid and engaging (Saputri, Sunardi, & Musadad, 2021). Furthermore, various empirical studies have demonstrated that the use of digital comics is highly effective in enriching specific foreign language vocabulary while helping learners comprehend the material more easily (Flores González, Flores, & Hernández, 2024; Septialti, Shaluhiyah, & Widjanarko, 2022).

Although the development of digital comics for German language learning has been conducted previously, the majority of prior studies have predominantly focused on general themes such as folklore, local legends, or school life (Susanty & Pujiastuti, 2024; Herlia & Sari, 2024). Moreover, the creation process generally still relies on manual methods using conventional drawing applications, which is highly time-consuming. To date, there is a scarcity of studies focusing on designing digital comics themed around medical professional communication utilizing the advanced capabilities of generative Artificial Intelligence (AI) in their production. In fact, modern AI applications like Gemini possess extraordinary multimodal capabilities, allowing them to process both text and images integratively (Banh & Strobel, 2023). This application can serve as an intelligent assistant to formulate natural clinical conversations and design character illustrations alongside hospital atmospheres within a single, efficient workflow.

Addressing this gap, the utilization of generative AI to design specific and contemporary foreign language learning media represents both an urgency and the novelty offered by this study. This study aims to develop and comprehensively describe the creation process of an interactive German digital comic themed *"Im Krankenhaus"* using the Gemini application, as well as to evaluate the feasibility of the final product. Ultimately, this comic is expected to directly support the learning process in the *"Deutsch im Pflege"* course, providing language students with a clear visual representation of the professional communication demands in an international work environment.

2. LITERATURE REVIEW

Research and Development (R&D) is fundamentally a systematic approach that is not only oriented towards creating an educational product but also towards testing the quality behind its creation process (Okpatrioka, 2023; Rahayu, 2025; Waruwu, 2024). In this study, the Design and Development Research model by Richey and Klein was selected as the conceptual foundation (Richey, Klein, & Tracey, 2010). This model divides the workflow into three continuous main phases: planning, production, and evaluation. This approach ensures that the resulting digital comic is not created spontaneously, but rather designed based on a clear

contextual needs analysis, realized through a structured framework, and refined through rigorous expert validation tests.

As the product output, the digital comic was chosen due to its potential as a multimodal narrative medium capable of harmoniously integrating text and visual elements. Unlike conventional text readings, digital comics facilitate readers in intuitively grasping the situational context through character gestures, panel layouts, and detailed settings (A'raf & Retnoningsih, 2025; Prihatiningtyas & Seinsiani, n.d.). This is highly relevant to the learning approach of *Deutsch für Pflegeberufe* (German for Nursing Professions), which requires learners to master functional communication skills in a clinical environment. Language mastery in this domain is not merely about understanding basic grammar; rather, it is an operational instrument for interacting with patients and fellow healthcare workers to maintain medical safety. Therefore, the comic material is specifically designed by highlighting the theme *"Im Krankenhaus"* (In the Hospital), which is contextualized within professional curriculum standards to facilitate a variety of real-life situations, such as anamnesis conversations, doctor's rounds, daily patient routine instructions, and shift handovers (Böck & Rohrer, 2015).

To realize the design of the comic, this study adopts generative Artificial Intelligence (AI) technology, specifically the Gemini application, as the primary supporting instrument. Unlike traditional AI systems that merely analyze data, generative AI based on Large Language Models (LLMs) like Gemini possesses multimodal capabilities to create new content both functional text and visual illustrations based on prompts provided by the user (Bordas, Le Masson, Thomas, & Weil, 2024; Sengar, Hasan, Kumar, & Carroll, 2024). In the context of creating learning media, this technology is positioned as an instructional designer assistant capable of significantly accelerating the production workflow. Nevertheless, various studies on AI educational governance emphasize that higher-order cognitive control remains absolutely in human hands (Pinho, Costa, & Pinho, 2025). The researcher holds full responsibility as the decision maker to direct the narrative flow, select image drafts, and validate the accuracy of the grammar and medical vocabulary *(Fachsprache)* generated by the system (Supriyadi & Pahmi, 2024).

A review of several previous studies indicates that the development of digital comics as a German language learning medium has indeed been quite extensively explored. For instance, prior studies have successfully developed German-language digital comics that were validated as highly feasible by experts (Hutabarat & Aruan, n.d.; Lestari & Afifah, 2021). However, the majority of previous studies have predominantly centered on general fictional themes such as folklore or elementary school life, and heavily relied on manual digital drawing

skills using graphic design software, which requires specific technical expertise and a lengthy production time. From this observation, a clear research gap is evident, where the utilization of multimodal generative AI capabilities to design situational digital comics particularly in the realm of medical German *(Deutsch im Pflege)* remains untouched. Based on this theoretical foundation and literature review, this study implicitly proceeds from the assumption that the integration of the generative AI Gemini into a structured design workflow can facilitate the creation process of a clinical digital comic that is accurate, efficient, and highly functional in supporting the communication readiness of prospective healthcare workers.

3. METHODS

This study utilizes a Design and Development Research (D&D) approach to design and develop learning media in the form of a German-language digital comic themed *"Im Krankenhaus"*. The primary reference for the development model is the Richey and Klein model, which structures the process into three continuous phases: planning *(Planung),* production *(Erstellung),* and evaluation *(Evaluation)* (Richey, Klein, & Tracey, 2010). The entire media design process was conducted at the Foreign Language Laboratory, Faculty of Languages and Arts, State University of Medan. Given that the focus of this study is the development of a product output, it does not employ a human population or sample, rather, it utilizes data in the form of words, sentences, and situational German dialogue scripts that represent real clinical communication.

As the initial instrument for drafting the script and storyboard, the researcher extracted data from the *Curriculum DaF für Pflegeberufe* and the reference book *Kommunikation im Krankenhaus* (Goethe Institut, 2020; Böck & Rohrer, 2015). From these sources, several key clinical communication situations were adapted ranging from greetings on the first day of work, patient anamnesis conversations, and body care instructions, to shift reporting which were then formulated into specific text instructions or prompts. The collection and production of visual data were subsequently carried out using the primary instrument of a generative Artificial Intelligence (AI) application, namely Gemini. This system was tasked with processing the given prompts to generate German conversation drafts as well as the comic panel illustrations. After the raw output was generated by the AI, the researcher took over the role of editing the grammar and assembling the layout using the Canva design platform.

To measure the quality and feasibility of the developed product instrument, data analysis techniques were conducted through expert validation tests. This evaluation process involved assessments from a German language material expert and a learning media expert.

The feasibility testing focused on grammatical accuracy, medical context suitability, visual design quality, and overall media functionality. The results of these tests are not elaborated in complex statistical formulas but are interpreted directly from the assessment scores and revision notes provided by the experts. This feedback was then analyzed and used as the main foundation for the researcher to make final refinements *(Überarbeitungen)*, ensuring that the resulting digital comic product is valid and feasible for application in learning.

4. RESULT AND DISCUSSION

The development of the digital comic *"Im Krankenhaus"* was carried out through systematic stages optimizing the capabilities of the generative AI Gemini. The results of this process include empirical documentation regarding the creation of the multimodal media and the results of the expert feasibility tests.

Planning Phase *(Planung)*

This process began with an analysis of nurses' clinical communication needs based on the primary reference books. The researcher divided the comic's storyline into six basic communicative situations: doctor's rounds, shift opening greetings, patient anamnesis, daily routine instructions, shift handovers, and emotional regulation. These six situations were then summarized into a storyline framework that served as a reference for formulating prompts or command instructions.

Production Phase Using the Gemini Application *(Erstellung)*

The Gemini application was utilized to simultaneously generate text scripts (text generation) and visuals (image generation) (Imran & Almusharraf, 2024). The researcher did not use simple commands but applied a structured prompting technique that explicitly integrated Learning Objectives *(Lernziele).* Through these detailed instructions, Gemini successfully formulated natural dialogues that accurately included target clinical vocabulary, such as Visite, Infusion, and Schmerzen.

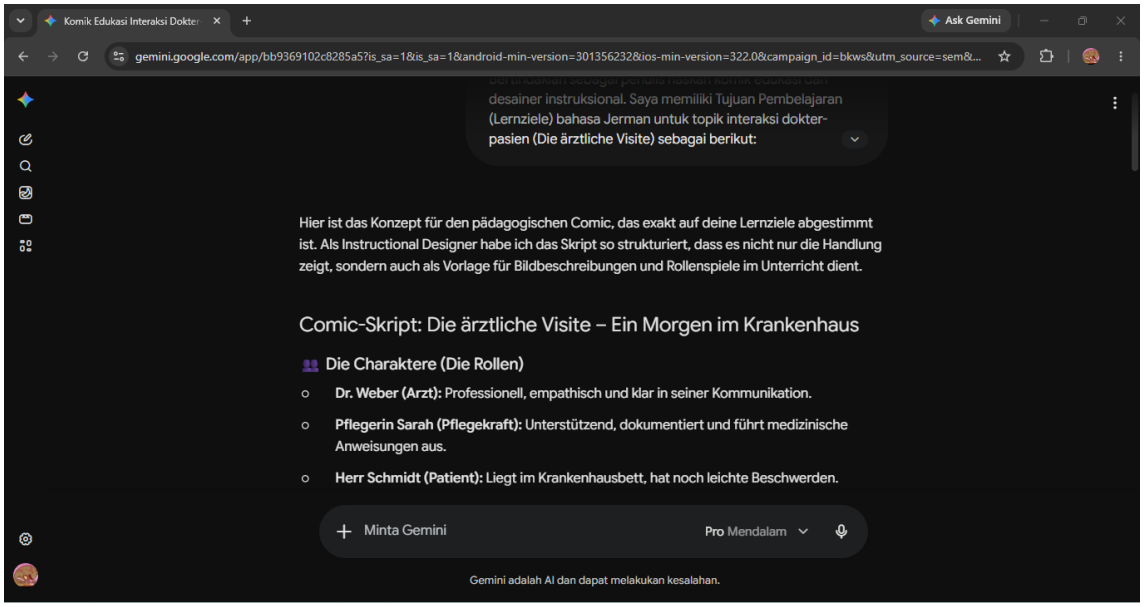

Fig 1. Integration of Learning Objectives in the Prompt and Gemini's Text Output

One of the main technical challenges in utilizing AI for comic media is character inconsistency across panels. This issue was successfully resolved using the image-to-image prompting technique, where the researcher established one main image as a visual reference anchor uploaded back into the system. This approach guided the AI to generate different poses without losing the character's original facial identity.

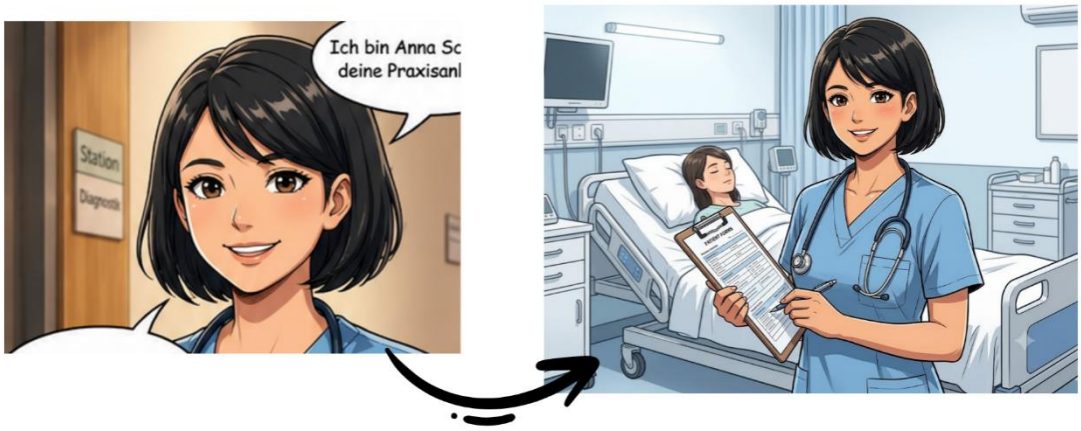

Fig 2. Visual Character Consistency Strategy Using a Reference Image

Arrangement and Layout Design *(Layouting)*

The validated B1 level German dialogue text elements and image panels were then downloaded and arranged using the Canva platform. Canva facilitated the layout arrangement, the insertion of speech bubbles, and the adjustment of page dimensions practically and neatly before it was finally ready to be published interactively.

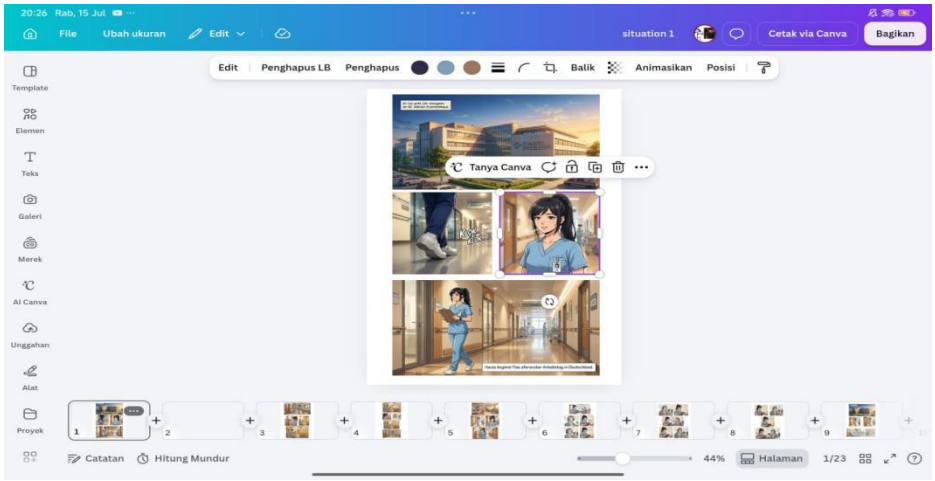

Fig 3. Comic Panel Arrangement Process Using Canva

Expert Validation Results and Discussion

The validation test showed highly satisfactory results, in which the material expert gave a feasibility score of 90%, falling into the excellent category. However, the most crucial finding in this evaluation was the recommendation to change the language proficiency level. In the initial design, the language was targeted at the A2 level. The material expert provided a correction stating that the demands of academic medical communication must be adjusted to the B1/B2 standard to be relevant for sixth-semester students. On the other hand, the media expert also gave a score of 95% in the excellent category for aspects of panel proportions, typography, and ease of access.

This lengthy process reaffirms the principle of AI governance in education: generative systems must absolutely be positioned merely as supporting tools. The quality and accuracy of the medical materials remain entirely dependent on the human oversight function as the decision maker to review the appropriateness of the terminology *(Fachsprache)* (Supriyadi & Pahmi, 2024). Beyond being academically valid, the final product was also integrated into the FlipHTML5 platform, allowing the comic to be accessed highly flexibly as an interactive digital book (flipbook) by scanning a QR code. Access to this comic is available via the following link:

https://online.fliphtml5.com/SituationenimKrankenhaus/Situationen-im-Krankenhaus/

Fig 4. QR Code for Accessing the FlipHTML5 Interactive Digital Comic

5. CONCLUSIONS

This study has successfully developed an interactive German digital comic themed *"Im Krankenhaus",* which is highly feasible for use as a clinical situation-based learning medium. The utilization of the generative AI Gemini proved to be highly effective and efficient in formulating functional dialogue scripts while simultaneously producing character illustrations in an integrated manner. The inherent technical constraint of AI in the form of visual inconsistency was convincingly resolved through a reference-based image prompting technique, while the weakness in curriculum target alignment was refined by revising the language proficiency level from A2 to the B1/B2 standard based on expert feedback. The final product, practically packaged within the FlipHTML5 platform, received a feasibility validation score of 90% from the material expert and 95% from the media expert. Overall, these findings prove that the integration of generative AI technology which firmly remains under human control and oversight is capable of accelerating the creation of functional, contextual, and easily accessible foreign language educational materials.

As an implication and follow-up to these findings, instructors are advised to integrate this interactive digital comic into the "*Deutsch im Pflege"* course to bridge the gap between theoretical grammar and real communication practices in a hospital environment. On the other hand, students or language learners can utilize this medium as independent study material to enrich their specific medical vocabulary *(Fachsprache)* and practice their reading comprehension *(Lesekompetenz).* Nevertheless, this study still possesses limitations, as its scope is currently confined to developing and measuring the product's feasibility level through expert assessments. Therefore, future researchers are highly recommended to design

subsequent experimental research within the classroom to directly measure the effectiveness of this digital comic in improving learning outcomes. Furthermore, exploring the use of the Gemini application to produce German professional educational comics in other fields of expertise, such as tourism *(Deutsch für Tourismus)* or engineering *(Deutsch für Technik)*, also serves as a highly prospective research recommendation to be developed in the future.

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