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Fostering Creative Thinking in Animation Scriptwriting through AI-Driven Analysis and Socratic Questioning

Panadda Jaiboonlue[a*], Wasan Na Chai[b] & Nattapol Kritsuthikul[b]

[a]*Department of Animation and Digital Media, Faculty of Science and Technology Bansomdejchaopraya Rajabhat University, Bangkok, Thailand*
[b]*Language and Semantic Techonolgy Laboratory, National Electronics and Computer Technology Center, Pathum Thani, Thailand*
*panadda.ja@bsru.ac.th

Abstract: This paper proposes an AI-powered framework to foster creative thinking in animation scriptwriting by integrating narrative analysis, Retrieval-Augmented Generation (RAG), and Socratic questioning. The system enhances existing scriptwriting tools through modules that analyze narrative structure, assess creativity, verify logical consistency, and generate theory-informed feedback. Its core innovation is the Feedback & Socratic Questioning Module, which provides personalized, context-aware prompts supported by RAG-based retrieval of relevant storytelling theories and examples. Delivered via an interactive chatbot interface, this feedback engages students in real-time reflective dialogue and guides them through iterative script development. By combining computational analysis with pedagogically grounded questioning, the framework demonstrates how AI can support higher-order thinking and narrative creativity in animation education.

Keywords: Creative Thinking, Animation Scriptwriting, Socratic Questioning, AI-Driven

1. Introduction

In the field of animation education, scriptwriting is a foundational skill that enables students to construct meaningful narratives and convey emotion through visual storytelling. However, many students face challenges in transforming abstract ideas into coherent plots, developing characters with depth, and applying narrative theories such as the three-act structure or character arcs. While instructors provide essential feedback, the increasing number of students and limited contact hours often hinder the depth and frequency of guidance provided during the creative writing process. To address this issue, previous work introduced a learning support tool aimed at enhancing students' awareness of narrative structure and creative thinking in scriptwriting. Building upon this foundation, the current research proposes an extended framework that integrates Artificial Intelligence (AI) (Holmes, Bialik, & Fadel, 2019) with Retrieval-Augmented Generation (RAG). This system is designed to analyze both screenplays and storyboards and stimulate reflective thinking by emulating Socratic questioning (Paul & Elder, 2006) an approach in which guided questions help learners examine their ideas, clarify intentions, and consider narrative alternatives.

The paper proposes a framework for an intelligent tutoring system that supports both creativity and structured thinking in animation scriptwriting. It integrates Vision-Language Models for multimodal analysis, computational metrics for creativity assessment, and Retrieval-Augmented Generation for grounding in narrative knowledge. Unlike existing tools, it emphasizes real-time, context-aware guidance that nurtures creative reasoning. This framework establishes a foundation for next-generation AI tutoring systems in creative education, with a focus on animation storytelling.

2. Animation script writing supporting tool

A prior study (Jaiboonlue et al., 2023) introduced a structured learning support tool grounded in narrative theory to enhance students' awareness and understanding of animation scriptwriting by guiding them through essential components such as setting, theme, character arcs, and conflict resolution, while enabling decomposition of ideas, logical structuring, and iterative instructor feedback. Experimental results showed significant improvements in script completeness, coherence, and adherence to storytelling conventions, with higher evaluation scores on revised scripts and a marked reduction in missing mandatory elements (e.g., 34% of students corrected earlier omissions). This work established the value of theory-informed, structured, and feedback-driven scriptwriting instruction, providing a foundation that the current research extends by integrating AI and RAG to enrich feedback and foster creative, reflective thinking.

3. Proposed Framework System

The proposed framework introduces an intelligent support system for animation scriptwriting that integrates AI-driven analysis, Retrieval-Augmented Generation (RAG), and Socratic questioning techniques. The system is designed to work alongside an animation script writing supporting tool that students use to draft and revise scripts and storyboards under instructor guidance. An overview of the proposed system is illustrated in Figure 1.

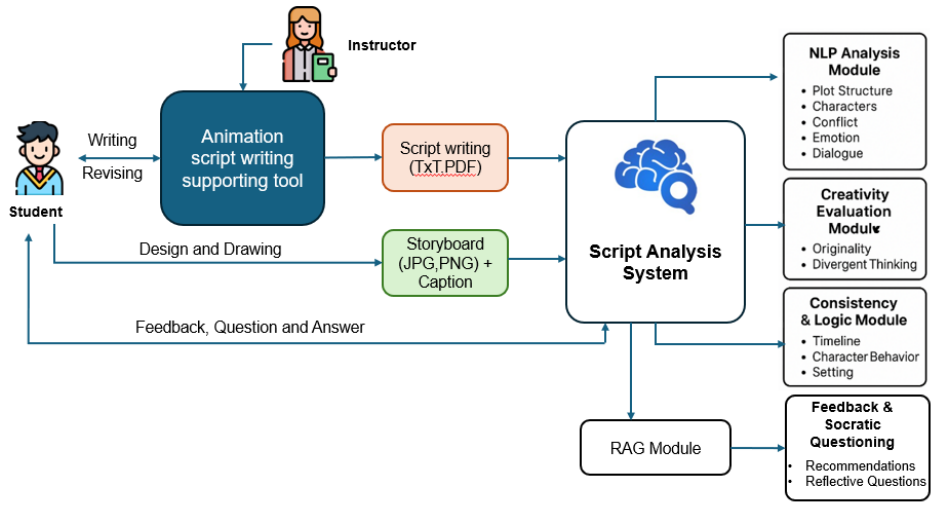

Figure 1. An overview of animation scriptwriting analysis system

The process begins with students composing their scripts using the supporting tool, with instructional guidance to ensure alignment with narrative theories such as the three-act structure, character development, and conflict resolution. Once the initial script has been reviewed and refined, it is exported in .TXT or .PDF format. Students then proceed to design a corresponding storyboard, complete with visual panels and descriptive captions, which represent the narrative flow of their animated film. Both the script and storyboard are submitted to the Script Analysis System, which connects directly to the authoring tool. This system is composed of 4 modules:

- **NLP Analysis Module:** This module uses a pre-trained Vision-Language Model (VLM) like CLIP (OpenAI, 2021) to verify alignment between storyboards and scripts. Storyboard panels are encoded into visual embeddings, while corresponding script captions are encoded into text embeddings within the same latent space. Alignment is measured via cosine similarity: scores near 1.0 indicate strong match, while lower scores signal mismatches for student reflection. The method relies on contrastive learning, which optimizes the model to link correct image-text pairs and separate incorrect ones.

- **Creativity Evaluation Module:** This module quantifies creativity by evaluating originality and divergent thinking in the narrative using computational linguistics techniques, turning abstract creative concepts into measurable metrics.
- **Consistency & Logic Module:** verifies logical coherence in terms of timeline, character behavior, and setting continuity.
- **Feedback & Socratic Questioning Module**: This module acts as the pedagogical core, combining outputs from all other modules into an interactive dialogue. An LLM, prompted with the student's script, analysis results (e.g., originality or alignment scores), and knowledge from the RAG module, generates targeted feedback that goes beyond generic comments for instance, suggesting revisions grounded in both analysis and screenwriting theory. This process ensures real-time, context-aware guidance and establishes a clear link from technical analysis to meaningful pedagogical support. Future work will explore optimal timing of Socratic questioning through A/B testing across different stages of the writing process.

Analytical results from the modules are sent to the RAG module(Bhatia, Vats, & Aggarwal, 2021), which retrieves relevant knowledge from sources like narrative theory, exemplary scripts, and rubric-based criteria. This context allows the system to provide targeted, theory-informed feedback and reflective prompts. All outputs are then consolidated in the Feedback & Socratic Questioning Module, delivering tailored guidance through a chatbot embedded in the scriptwriting tool. This real-time, interactive platform supports iterative refinement, combining technical analysis with reflective questioning to improve learning outcomes.

The primary pedagogical objective of the proposed system is to foster students' creative thinking through iterative reflection, guided exploration, and theory-informed questioning. By decomposing scripts into analyzable components and providing tailored feedback enhanced with Socratic questioning and external knowledge via RAG, the system encourages learners to move beyond surface-level storytelling. It supports the development of higher-order thinking skills such as divergent thinking, originality, synthesis of ideas, and evaluative judgment. Ultimately, the system aims to transform the scriptwriting process into a reflective, creative, and cognitively engaging learning experience.

4. Conclusion

This paper proposed a technically-grounded framework for an intelligent animation scriptwriting support system that integrates AI-driven analysis, RAG-based retrieval, and Socratic questioning to enhance students' creative thinking. By specifying the implementation strategies for each module—leveraging Vision-Language Models for multimodal alignment, computational metrics for creativity, and a RAG architecture for knowledge grounding—this paper provides a clear and feasible blueprint for development. The framework builds upon an existing scriptwriting support tool and extends its capabilities by providing structured, theory-informed, and cognitively engaging feedback.

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