LingoComics: Co-Authoring Comic Style AI-Empowered Stories for Language Learning Immersion with Story Designer

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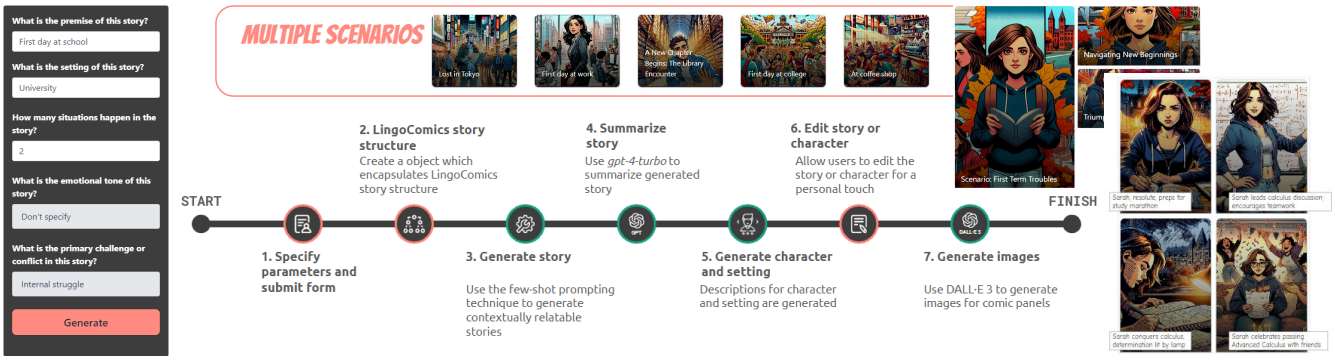

Figure 1: In LingoComics, learners start by inputting their story parameters (i.e., premise), and the system generates the basic story and structure using AI. The learner can edit details (i.e., character description) before generating comic-style panels.

Abstract

In language learning applications, contextualization and immersion rely on real-life communication and remain challenging despite the recent advancements in artificial intelligence (AI) that have significantly impacted educational and language learning experiences. This paper introduces LingoComics, a web application that embeds AI-empowered stories with narrative and comic-style illustrations to enhance contextualization and personalization in language learning. At the core of LingoComics is the Story Designer module, which allows learners to co-author short narratives using a structured set of parameters within a simple user interface. Leveraging OpenAI's GPT-4-turbo for text completion and DALLE-3 for image generation, the Story Designer generates contextually relatable stories and comic-style images based on user input.

Future work includes user evaluations, activity designs, and additional language learning support features. LingoComics aims to increase learners' confidence and motivation by enabling personalized, situational language practice, preparing them for real-life communication.

CCS Concepts

• **Human-centered computing** → **User centered design**; • **Applied computing** → **Interactive learning environments**.

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1 Introduction

Recent advancements in artificial intelligence (AI) have significantly impacted individuals' educational and language learning experiences. Yet, contextualization and immersion remain challenging, especially with language learning applications. LingoComics (Fig. 1) is a web application that embeds AI-empowered stories, including narrative and comic-style illustrations, to enhance language learning regarding contextualization and personalization. LingoComics proposes using co-authored, relatable, and situational narratives featuring the learners' interests with comic-style illustrations to enable personalized and meaningful foreign language practice. This paper presents the design of LingoComic's core module, the *Story Designer*. Similarly to others who have explored generative AI (genAI) for co-authoring and improving creative writing (i.e., [2]), the Story Designer allows learners to co-author their short narratives using a structured set of parameters within a simple user interface where they can describe aspects, such as the story premise, physical environment and the main character's physical and personality traits, for the narrative and illustration generation.

Traditional language learning apps like Duolingo and Memrise lack deep immersion in authentic environments, focusing instead

on a pre-determined curriculum emphasizing memorization and vocabulary [1, 4]. With the rise of genAI technologies and despite the success of these conventional apps, there has been a growing interest in exploring alternatives that cater to different learning preferences and provide more personalized content, which seems to result in an increase in motivation for learning [3, 8]. LingoLand is at the intersection of AI and immersive technologies to enrich the learning experiences [7]. This app uses AI to leverage immersion and engage users in their interactive game world, where they have a dynamic learning environment through customized missions that aim to keep learners engaged. Similarly, the Language Urban Odyssey (LUO) is an open-world serious game where players interact with AI-driven characters to simulate real language and provide practical scenarios[8].

The Story Designer is the first step toward LingoComic's vision, providing an AI-empowered, and learner-centred application for contextual and situational language learning. Although genuine language fluency still requires real-life communication practice and validation, LingoComic aims to increase the learners' confidence and motivation by role-playing real-life situations ahead of time.

2 LingoComics: Story Designer

The stories in LingoComics are split into small modular components (Equation 1). Each story generated has one scenario, and depending on the learner's input, each scenario can have N situations. Each situation has four moments, each corresponding to a comic-style panel illustration of the story. Even if the learner uses the same set of parameters at a different generation, the scenario generated will vary due to the non-deterministic nature of genAI technologies.

$$Story_{generation} = Scenario = \sum_{n=i}^{N} Situation_i \quad (1)$$

$$Situation_i = \{moment_1, moment_2, moment_3, moment_4\} \quad (2)$$

The Story Designer module aims to support learners to generate (1) contextually relatable stories using OpenAI's GPT-4-turbo text-completion API and (2) comic-style images to represent the story leveraging OpenAI's DALLE-3 image generation API.

Learner's Situational Input. In Story Designer, stories are co-authored, allowing learners to input their situational details and create their comic-style stories empowered by AI. It provides a user-friendly graphical interface that structures key elements of story generation prompting –— premise, environment setting, number of key situations, emotional tone, and primary challenge or conflict. Thus, the learner is not required to know prompt engineering.

In Fig. 1, the story's premise is "First day at school" taking place at "University". The user asked for 2 situations to be created in the scenario without specifying an emotional tone where the primary conflict in the story is "Internal struggle".

After specifying the parameters, the back-end generates the scenario for the story.

2.1 Prompting: generative AI pipeline

After the story's situational specifications are given and edits are made to the generated descriptions, if any, the scenario is created. The Story Designer uses a few-shot prompting technique, taking in pre-defined prompts and creating a general scenario based on the user-specified situational parameters and character/environment descriptions. Using GPT, the general scenario is then summarized into a concise version, saving on tokens for future image generation prompts [6]. The story title, character, and environment setting are extracted through the summarized story. If any details are lacking, the system has a fallback procedure to fill in the details.

Learner's Input on Descriptions. After the summarized story character and environment setting descriptions are generated, the user may edit them. This enables learners to make the generated story more relatable to their circumstances; for example, they can edit the character to display their physical or personality traits, giving a sense of relatedness, representation, and immersion. These descriptions are used for the next steps in generating the N situations and their respective moments for image generation.

Generating the N situations. The system splits the parameters and formulates individual prompts fed to the *gpt-4-turbo* model. The model is provided with a default prompt specifying the nature of the results. For example, all stories need to be contextually relatable, and then the parameters are given in addition to the default prompt. This method provides consistent results which generate contextually relatable situation text stories that fit within the generated scenario.

Generating the comic-style panels. OpenAI's *DALLE-3* image model generates all images in LingoComics. *DALLE-3* token limitation (1,000) adds complexity when creating comic-style illustration panels. Thus, we took a summarization approach at each image generation step to reduce the tokens used. After some tests, we noticed visual inconsistencies between panels in the same situation. For example, the main character changes physical traits. To tackle that, we used GPT to rewrite the descriptions (i.e., character, environment, moment) to be concise yet descriptive. On top of that, we added specific actions (related to the moment in the situation) performed by characters in the panel. This approach gave consistent results, as every panel needs to be generated individually to ensure the correct representation of individual moments. Still, all four panels must also have enough visual continuity.

3 Conclusion & Future Work

As we conclude the implementation of the Story Designer, future work includes three main steps (1) a user evaluation of the generated stories regarding the quality of its results and the users' expectations; (2) the design of activities such as matching the moment description to its respective panel, and "create your own adventure" where the learners can extend situations dynamically using multiple choice options on how to react next; (3) to incorporate other language learning support such as translation to different languages, definitions, word bank, spaced-repetition, and others.

In conclusion, this paper describes the Story Designer module of LingoComics. LingoComics proposes an AI-empowered approach to situational and contextual language learning via creating, interacting, and reviewing learner-curated stories. Other AI-powered educational technologies have been shown to help language learners with motivation and engagement [3, 5, 8]; after our language learning activities are implemented, LingoComics will be ready for similar validation through user studies; we believe LingoComics has the potential to help learners with confidence in using foreign language in real life scenarios.

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