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Exploring Multimodal Perspectives in Collaborative Writing: Sentiment Analysis and Word Frequency in Natural Language Processing

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Abstract

This research explored Korean EFL learners' perspectives towards three different media modes in collaborative writing on Google Docs. To examine this, the study utilized sentiment analysis and word frequency in natural language processing (NLP). The results suggest how media modes can be effectively deployed in collaborative English writing.

Keywords: Multimodality, Collaborative writing, Sentiment analysis, Word frequency, NLP

Introduction

In the realm of multimodal communication, the interaction between a writer and diverse modes plays a pivotal role in sculpting the processes (Jewitt, 2005) through which meaning is constructed for a narrative task. However, it remains unclear how language learners leverage multiple semiotic resources, therefore this research explored the English as Foreign Language (EFL) learners' perspectives when using three different modes—a movie clip with sound, a movie clip without sound, and a series of images—to formulate meaning in collaborative writing on Google Docs. To do this, the study deployed sentiment analysis of three different media modes along with word frequency analysis of these modes in natural language processing (NLP) to analyze learners' responses.

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Previous Studies

Sentiment analysis is a classification task in NLP, which categorizes opinions as positive, negative, or neutral attitudes in text (Ghosh et al., 2023). Although it has been extensively utilized to assess public discourse or opinion across various fields, it remains relatively under-researched in language learning. Given that collaborative learning can improve reflective thinking and help learners negotiate the meaning of content (Jim et al., 2024; Zhang et al., 2024) while engaging with various semantic modes, EFL learners' perceptions of modes with peers can be important features in delivering meaning. Additionally, word frequency analysis is often employed to elucidate the importance of words within the text and identify keywords to gain insights into the participants' perceptions. With respect to this, the research aimed to assess English language learners' perspectives using NLP to better understand the impact of media modes in collaborative writing.

Methods

This study adopted action research for a 10-week period. The participants were 90 Korean EFL learners, and their English level ranged from A2 to B2 in accordance with the Common European Framework of References (CEFR). The participants were tasked with story writing; they were randomly and evenly assigned to one of the following groups and asked to write a story together: a group with a movie clip including sound, a group with no sound in a movie clip, and a group with a series of images. After completing the task, they responded to two open-ended questions regarding their opinions towards their assigned group modes (the first question) and collaborative work (the second question) via a Google form. Their answers, written in Korean sentences, were translated into English. NLP techniques utilized for sentiment and word frequency were coded in Python. A transformer model trained by distilling BERT (Bidirectional Encoder Representations from Transformers) was downloaded from Hugging Face and used to conduct sentiment analysis. The sentiment analysis values were adjusted to range from –1 to 1; a positive score corresponded to 1 point, neutral to 0 points, and negative to –1 point. The Natural Language Toolkit (NLTK) was also installed for lemmatization to extract nouns and determine the frequency of words as keywords.

Results

The data analysis results indicated that the participants' satisfaction towards the three different modes were as follows: 0.89 for the movie clip with sound,

0.85 for the movie clip without sound, and 0.75 for the series of images in sentiment analysis. Similarly, the satisfaction ratings on collaboration denoted that the movie clip without sound scored 0.90, the movie clip with sound was 0.89, and the series of images was 0.75. Regarding word frequency, the most common word was "content", and notably, prominent words occurred in each different mode. The movie clip with sound mode showed a recurring use of "expression", "confidence", "translation", "grammar", and "vocabulary". The movie clip without sound mode presented the use of "imagination", "grammar", and "inspiration". The series of images resulted in a greater use of "sentences" and "association".

Discussion and Conclusion

This study examined how various media modes can scaffold collaborative writing from EFL learners' perspectives and aimed to gain an in-depth understanding of their affordances. Noteworthy was the fact that the language learners considered content to be crucial for creating a storyline, which led to the two movie clips showing more positive perspectives. In line with it, since it was easier to negotiate meaning with a storyline based on a series of images than with the other two modes, the sentiment score was lower. Despite the fact that the perspective towards the three modes and collaborative work was disparate, the findings suggest that media modes can be used effectively in collaborative English writing strategies. According to this analysis, the study aims to position Computer Assisted Language Learning within an interdisciplinary framework that integrates language with the concept of multimodality to suggest new avenues for research and practice.

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