



The Effect of Color-Coded Subtitles on Vocabulary Retention

Suleepron Srisakda¹ Apisit Noiprated² Napatsawan Pansuk³
Wanwisa Phetcharatmune⁴ Chamnong Kaewneam^{5*}

¹⁻⁵ Program in Foreign Languages for Communication, Faculty of Liberal Arts, Rajamangala
University of Technology Srivijaya, Songkhla 90000, THAILAND

*Corresponding Author Email: [*chamnong.k@rmuts.ac.th](mailto:chamnong.k@rmuts.ac.th)

(Article history) Received: 2026-03-09, Revised: 2026-03-18, Accepted: 2026-04-22

Abstract

The purpose of this study was to investigate the effect of color-coded subtitles on vocabulary retention among first-year students enrolling at a Thai university, as well as the learners' views about the intervention. A quasi-experimental and pre- & post-test research design was carried out. Thirty students who were taking an English reading and writing course were given a pre-test, which measured the vocabulary knowledge before the intervention. Each student was then assigned to two groups, one each, based on their pre-test results. An independent samples t-test suggested that the vocabulary knowledge of the students from the two groups was not significantly different. The students in the first group watched the first version of the video, which came with color-coded subtitles, and those in the second group engaged in the other, incorporating traditional subtitles. Both groups sat for the same post-test after the intervention. The students from both groups showed improvement in vocabulary knowledge (from $M=12.73$ to $M=22.13$ and from $M=10.07$ to $M=14.20$, respectively). The students from the first group performed significantly better than the second group. The differences were at a 0.05 level. In addition, the students expressed very positive views about the usefulness of the color-coded subtitles to assist in vocabulary learning (mean=4.33 on a scale of 1–5). It is concluded in this study that the use of color-coded subtitles should be encouraged in EFL classrooms, because it can contribute to the retention and acquisition of new vocabulary.

Keywords: Color- coded subtitles, movie subtitles, vocabulary retention, vocabulary acquisition

1. INTRODUCTION

The way that English is taught and learned has changed significantly nowadays. English classrooms benefit more from authentic materials and social media. YouTube and Netflix are, for example, the media that learners use to learn English. Among the teaching techniques, subtitles incorporating the media have also been an indispensable tool for learning. Apart from the content, learners are also acquiring English language skills and patterns of the language when enriching them with both sounds and words (Zanón, 2006).

The use of subtitles is a matter of the way they are presented. Traditional subtitles are usually shown as ordinary white or yellow text over a black or transparent background. They primarily provide plain transcription, which aids in the

understanding of the content but is not particularly concerned with deeper linguistic aspects such as vocabulary or grammar (Marzban & Zamanian, 2015). Besides the traditional form, color-coded subtitles provide a more explicit didactic function. By applying various colors to stand out between speakers or to emphasize chunks of speech, they are capitalizing on dual coding theory, which states that learning is enhanced when information is coded both verbally and pictorially (Paivio, 1991). Studies show that visual markers displayed in such a manner can lead to targeted attention, reduced cognitive load, and improved vocabulary retention (Wang & Pellicer-Sánchez, 2022; Szarkowska & Boczkowska, 2022).

Vocabulary retention plays an important role in learning English. It is the ability of learners to retain new words in mind in the long term, which directly points to their potential for oral input comprehension (Nation, 2013). Learners without sufficient vocabulary knowledge cannot usually decode and process oral input effectively. Research has confirmed that exposure to vocabulary through frequent repetition significantly strengthens retention and understanding (Webb, 2007; Peters & Webb, 2018). As language abilities complement one another, enhancing one will always enhance the other.

Specifically, in a Thai university context in which this study is based, learners take a few English courses in the general education category required by their study programs. However, the students, in general, come to the classrooms with very beginning levels of English. It is essential in this setting to enhance basic understanding and knowledge of English vocabulary for further enhancement for academic purposes.

Studies have compared subtitle modes to one another. However, most focus on whether subtitles are useful (Black, 2021). Though platforms such as TED-Ed and LingQ have already ventured into color-coded subtitles, it remains uncertain whether this kind of subtitle will actually be beneficial for the context of the study. Previous research, such as Mardani & Najmabadi (2016), also provides a methodological model for comparing subtitle types and their impact on incidental vocabulary learning. This study continued from the study to examine traditional and color-coded subtitles within the Thai undergraduate context. In addition, studies have investigated ways to acquire vocabulary in many Thai settings, for example, Pantaworn, et al. (2024). This study highlights the vocabulary retention through a social media platform as well as the learners' perspectives on the intervention.

It is anticipated that building a more complete picture of how a minor change in design could bring about more energetic, productive language learning is possible, which can be a cost-effective and easy solution for both independent and classroom learners.

Specifically, the study had two research objectives.

1. To compare the impact of color-coded subtitles and traditional subtitles on vocabulary retention among beginning learners of English.
2. To examine learners' views on the use of color-coded subtitles in English vocabulary retention.

2. LITERATURE REVIEW

Vocabulary knowledge takes an important position in language learning. The lack of necessary vocabulary will result in inadequate comprehension of spontaneous conversation or natural speech (Nation, 2001). Webb's (2007) experiments confirmed that repeated hearing conditions enlarged exposure to words and increased long-term retention. Peters and Webb (2018) also demonstrated that learners who were exposed to videos with multiple repetitions of target vocabularies scored higher on vocabulary recall tests than learners exposed to the words alone through reading or hearing them in isolation. The emphasis on vocabulary will lead to improvement in other skills (Paivio, 1991). In addition, when learners hear words used over and over again in situations of use—especially in audiovisual input—both their memory for the words and their understanding of how they are being used are established. Vocabulary storage, or how the learner stores and retrieves lexemes in the long term, offers the foundation for other processes of language such as understanding, fluency, and critical listening as well as other skills (e.g., Zanón, 2006).

Subtitles have been brought into English classrooms to enhance vocabulary and listening comprehension, starting with an add-on for the deaf to being an essential part of multimedia language learning. With the classroom slowly phasing out print instruction, subtitles have become a useful step towards enabling language input both through the visual and through the auditory channel. Vanderplank (2010) is a key author in this regard and emphasizes that subtitles not only serve as written proof of oral input but also form a "permanent transcript" that learners can rely on to facilitate their listening and comprehension.

Subtitles allow learners to connect written and oral language simultaneously, providing contextualized input that triggers vocabulary acquisition, sensitivity to pronunciation, and attention to syntax. Zanón (2006) also suggests that subtitles engage not just in exposure to language but also active learning by providing learners with the ability to observe words and grammatical units used in authentic communicative contexts. The double exposure—visual and auditory—provides a form of scaffolding that is advantageous for language learners at all proficiency levels.

While classic subtitles give dialogue in white letters, they are unlikely to highlight the most significant portions of a sentence. This shortage has bred interest in more sophisticated forms of subtitles, such as color-coded subtitles that seek to expose learners to a more formalized and visually enriched way of language understanding. Color-coded subtitles use different colors to mark different speakers or highlight specific language structures, for example, adjectives, verbs, or nouns. This is echoed by Paivio's (1991) dual-coding theory, which explains how the information is stored more effectively when both verbally and visually. Having the language delivered in more than one channel allows learners to develop firmer cognitive links. The color-coded captioning as a visual aid helps learners allocate attention more effectively, especially in trying to read rapid speech or foreign vocabulary. Employing verbs in red and nouns in green, for example, can help learners explore sentence structure more efficiently.

Aside from cognitive gains, learners' views on the tools being implemented contribute significantly towards their motivation and interest. Whether or not a learning tool can be proven to be effective is less important compared to how well learners accept and embrace it for actual real-world use. Szarkowska and Boczkowska (2022) stress that learners' attitudes towards educational technology can determine their readiness to utilize it at a consistent and meaningful level. If colored subtitles are distracting or confusing for learners, then the cognitive benefits they are supposed to provide will be lost or even amplified. Some of the early findings are that learners appreciate the clearness and direction provided by color differentiation, particularly when learning complicated grammatical structures (Black, 2021). However, problems arise: Are the learners overwhelmed by excess color? Can they focus more readily when color cues are consistent? These are issues to be considered, especially if the intention is to create tools that allow—that do not hinder—learning.

3. RESEARCH METHODS

3.1 Research Design

This study employed a quasi-experimental pre-test and post-test design. Research participants were measured for their vocabulary knowledge before an intervention. After the intervention, they were tested for their vocabulary knowledge again. The students' perspectives on the use of color-coded subtitles, the focus of the study, were also examined by means of a questionnaire.

3.2 Participants

The participants were 30 first-year undergraduate students who were taking an English Reading and Writing course at Rajamangala University of Technology Srivijaya. The course was one among the general education subjects offered to students from different majors across the university. The research participants were purposefully selected by the fourth author, who was teaching the course to many groups of students. The course lecturer observed this group of students' limited performance on vocabulary. A new instructional technique should be invented to reduce the problem. The students were informed of the purpose of the research that could bring about better results in vocabulary learning. They agreed to participate in the study, and they were measured for vocabulary knowledge prior to the intervention. They were then assigned to two groups of 15 people each based on the pre-test results. The two groups were exposed to different videos and kinds of subtitles, i.e., color-coded and traditional subtitles (see 3.3.2). To ensure that both groups had comparable vocabulary ability before intervention, an independent-samples t-test was carried out. The results suggested no significant differences between the two groups of students ($M = 12.73$ and 10.07 , respectively) at the 0.05 level, as shown in Table 1.

3.3 Research Instruments

Three kinds of research instruments were developed to find the effect of color-coded movie subtitles on vocabulary retention: 1) a pre-test and a post-test, 2) a video with color-coded subtitles and a video with traditional subtitles, and 3) a satisfaction questionnaire.

3.3.1 Pre-test and Post-test

A pre-test and a post-test were to assess the vocabulary knowledge of the participants prior to the intervention and vocabulary retention after the intervention. The tests measured the same 30 words built into the videos designed for this study. However, the test questions were slightly modified to avoid the practice and memory effect of the pre-test and the post-test. Both the pre-test and post-test came with multiple-choice and matching questions. The participants spent approximately 20 minutes to finish the tests.

3.3.2 Videos with Subtitles

Two videos of two minutes each were created, one with color-coded subtitles and the other with traditional subtitles. The content of the videos was the same and based on a text for writing practice titled "The Best Hamburger of My Life" (Savage & Shafiei, 2007). In the production process of the videos, the text was split into small parts, pictures were generated, and videos were made by using two applications, i.e., Gemini and CapCut. The videos were then voiced over by an invited speaker of English. Finally, the two forms of subtitles were created and incorporated into the two videos. Different colors, i.e., blue, red, and green, were applied to the subtitles of the first video to highlight different parts of speech, i.e., nouns, verbs, and adjectives, respectively. Traditional subtitles in which white text was presented on a black background were employed with the second video. After the pre-test, the students viewed the videos in separate rooms to prevent interactions between the research participants.



Figure 1 Color-coded Subtitles vs. Traditional Subtitles

3.3.3 Questionnaire

A satisfaction questionnaire was administered to the first group of participants who were engaged in the color-coded subtitles. The first group of participants were asked to evaluate the usefulness of the color-coded subtitles applied to the first video on a scale of zero to five: 0 (not at all), 1 (slightly), 2 (somewhat), 3 (moderately), 4 (very), and 5 (most).

All of the instruments were developed by the first to third authors. They were checked for correctness, suitability, and practicality by a panel of experts, that is, three English lecturers working at the research site. The measurements of the instruments were completed through item-objective congruence (IOC) tables. The subtitles, color codes, test items, and questions in the questionnaire were scored on a scale of three: 1 (Congruent), 0 (Not sure), and -1 (Incongruent). Items with an IOC of 0.5 and above were considered valid and suitable for use, whereas items with an IOC below 0.5 were reviewed and modified according to experts' advice before data collection.

4. ANALYSIS AND FINDINGS

4.1 Vocabulary Retention

To determine whether there were differences between the vocabulary retention of the participants who viewed the video with color-coded video (G 1) and those watching the version with traditional subtitles (G 2), an independent-samples t-test was carried out on the raw data from both groups.

Table 1 Vocabulary Knowledge and Retention

Comparison						t	P-value
Source	N	M	Source	N	M		
G 1 Pre-test	15	12.73	G 2 Pre-test	15	10.07	1.4734	0.075896*
G 1 Pre-test	15	12.73	G 1 Post-test	15	22.13	-4.4845	0.000057*
G 2 Pre-test	15	10.07	G 2 Post-test	15	14.20	-2.0457	0.025143*
G 1 Post-test	15	22.13	G 2 Post-test	15	14.20	3.4788	0.000833*

*Sig. 0.05

Table 1 shows that both student groups demonstrated improvement in vocabulary after the intervention. The mean scores of the group engaging in color-coded subtitles increased from 10.07 to 14.20. The scores of the group viewing the video with traditional subtitles increased from 12.73 to 22.13. The group engaging in color-coded subtitles showed much more improvement, comparing 14.20 and 22.13. The t-test confirmed the significant differences. The statistically significant differences were at 0.05 levels.

4.2 Learners' Views

Two kinds of descriptive statistics were employed to analyze the research participants' feedback on the usefulness of color-coded subtitles to support vocabulary learning, that is, mean (M) and standard deviation (SD). The values collected from the questionnaire by means of a rating scale were interpreted as follows: 0.00–0.45 (not at all), 0.46–1.45 (slightly), 1.46–2.45 (somewhat), 2.46–3.45 (moderately), 3.46–4.45 (very), and 4.46–5.00 (most).

Table 2 Learners' Views on the Color-coded Subtitles

Item	Statement	M	SD	Interpretation
1	The colour-coded subtitles helped me understand new vocabulary better.	4.53	0.52	Most useful
2	Using colour-coded subtitles helped me focus more on the video.	4.40	0.63	Very useful
3	I feel that learning English from the video with colour-coded subtitles was easier.	4.47	0.51	Most useful
4	The colour-coded subtitles helped me distinguish important words from general words.	4.27	0.70	Very useful
5	I think colour-coded subtitles are a useful tool for learning English.	4.27	0.70	Very useful
Overall		4.33		Very useful

Table 2 presents positive feedback on the use of color-coded subtitles on the first video for vocabulary learning. On a scale of 0 (not useful at all) to 5 (most useful) The overall mean fell to the very useful level ($M = 4.33$). Specifically, the learners considered that the color-coded subtitles were most useful because the subtitles helped them understand new vocabulary better ($M = 4.53$), and they felt that learning English from the video with color-coded subtitles was easier than usual ($M = 4.47$). In addition, the learners reported that the use of color-coded subtitles was very useful when the subtitles helped them focus more on the video ($M = 4.40$), distinguish important words from general words ($M = 4.27$), and so the subtitles were a useful tool for learning English in the learners' perspectives ($M = 4.27$).

5. DISCUSSION AND CONCLUSION

The findings of this study showed that using color-coded subtitles can effectively promote vocabulary acquisition. Although the performance of both groups improved after watching the videos, the performance of the group viewing the video with the color-coded subtitles was significantly better. The outcome confirmed that using visual information to differentiate grammatical categories can facilitate deeper vocabulary acquisition, as recommended by scholars in this field (e.g., Paivio, 1991; Marzban & Zamanian, 2015). More importantly, the technique investigated in this study was embraced by the learners to a high extent, which is very important when a new educational technology is designed (Szarkowska and Boczkowska, 2022).

The findings suggest the use of visual enhancement strategies, such as color-coding, that can lead to cognitive and instructional benefits in vocabulary learning, particularly for beginning learners. There is a variety of free technology these days that English and other language instructors or learners can apply to fit their teaching and learning environments. In this study, the color-coded subtitles were hand-made using Gemini and CapCut by the researchers. However, we can take the liberty of the state-of-the-art generative AI to create a variety of suitable color codes as well as other learning tools when we are sufficiently exposed to functions and instructions given to the GenAI.

The present study investigated the effect of color-coded subtitles on vocabulary retention. While the number of research participants was minimal, it is argued that a minor change in design, rather than a large scale, could bring about a

more energetic, productive, cost-effective, and easy solution for real classrooms. Suggested by the research findings, further investigations into the use of color-coded subtitles can be done with more advanced scenarios, for example, influential speeches given by big names of the world. Therefore, beginning learners can also feel and enjoy the natural language rather than the translation of the texts into the learners' known languages.

REFERENCES

- Black, S. (2021). The potential benefits of subtitles for enhancing language acquisition and literacy in children: An integrative review of experimental research. *Translation, Cognition & Behavior*, 4(1), 74-97. <https://doi.org/10.1075/tcb.00051.bla>
- Mardani, M., & Najmabadi, A. (2016). The effect of movies with different types of subtitles on incidental English vocabulary learning of Iranian high school students. *Research in English Language Pedagogy (RELP)*, 4(1), 52.
- Marzban, A., & Zamanian, M. (2015). The impact of the subtitling task on vocabulary learning of Iranian EFL learners. *Journal of Applied Linguistics and Language Research*, 2(1), 1–9.
- Nation, I. S. P. (2013). *Learning vocabulary in another language*. Cambridge University Press.
- Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology*, 45(3), 255–287. <https://doi.org/10.1037/h0084295>
- Pantaworn, K., Sukprasert, P., & Kangkha, P. (2024). Linking handmade vocabulary media for enhanced learning outcomes. *Liberal Arts and Social Studies International Journal*, 1(3), 17–33.
- Peters, E., & Webb, S. (2018). Incidental vocabulary acquisition through viewing L2 television and factors that affect learning. *Studies in Second Language Acquisition*, 40(3), 551–577. <https://doi.org/10.1017/S0272263117000407>
- Savage, A., & Shafiei, M. (2007). *Effective academic writing 1*. Oxford University Press.
- Szarkowska, A., & Boczkowska, J. (2022). Colour coding subtitles in multilingual films: A reception study. *Perspectives: Studies in Translation Theory and Practice*, 30(3), 520–536. <https://doi.org/10.1080/0907676X.2020.1853186>
- Vanderplank, R. (2010). Déjà vu? A decade of research on language laboratories, television and video in language learning. *Language Teaching*, 43(1), 1–37. <https://doi.org/10.1017/S0261444809990267>
- Wang, A., & Pellicer-Sánchez, A. (2022). Examining the effectiveness of bilingual subtitles for comprehension: An eye-tracking study. *Studies in Second Language Acquisition*, 45(4), 882–905. <https://doi.org/10.1017/S0272263122000493>
- Webb, S. (2007). The effects of repetition on vocabulary knowledge. *Applied Linguistics*, 28(1), 46–65. <https://doi.org/10.1093/applin/aml048>
- Zanón, N. T. (2006). Using subtitles to enhance foreign language learning. *Porta Linguarum*, 6, 41–52. <https://doi.org/10.30827/Digibug.30659>