The Effectiveness of Storyboards on Vocational High School Students' Speaking Skills

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Abstract

Vocational high school students often face difficulties in developing their English-speaking performance in classroom learning. Integrating digital visual media may support students in practicing speaking more effectively. Therefore, this study investigates the effectiveness of Digital Storyboard using the Storyboard That platform to improve vocational high school students' speaking skills. This study employed a one-group pre-experimental design involving students from a public vocational high school in Sidoarjo. Students' speaking performance was measured using pre-test and post-test assessments and analyzed using the Wilcoxon Signed-Rank test and effect size analysis. The results revealed a significant improvement in students' speaking scores, with the mean score increasing from 45.06 in the pre-test to 57.06 in the post-test. The statistical analysis indicated a significant difference between the two tests ($Z = -5.233$, $p < .001$), with a moderate-to-large effect size (Cohen's $d = 0.71$). These findings suggest that digital storyboard media can effectively support the improvement of vocational high school students' speaking performance in English learning.

***Keywords: d**igital storyboard, speaking skills, vocational high school, visual scaffolding*

INTRODUCTION

English speaking competence has become an essential skill for vocational high school students, particularly because they are expected to communicate effectively in professional environments such as job interviews, workplace interaction, and service-related communication (Efrizah et al., 2021). In the era of globalization and increasing industry demands, vocational graduates are not only required to possess technical expertise related to their field of study but also the ability to communicate ideas clearly in English. As many industries operate within international networks, English communication skills are increasingly considered an important factor that supports students' employability and professional readiness.

Despite its importance, many vocational high school students still experience considerable difficulties in developing speaking competence in English. Classroom practice frequently reveals that students hesitate when asked to express ideas orally, provide very limited responses, or rely heavily on written notes before speaking. These behaviours indicate that students often struggle to formulate ideas spontaneously during oral communication. Empirical studies also report similar challenges among EFL learners. Milania et al. (2021) found that vocational learners often face limitations in vocabulary, lack confidence, and experience difficulty organizing ideas when performing speaking tasks. Emotional factors such as anxiety and fear of making mistakes further influence students' willingness to participate in oral activities (Sun, 2024). In addition, national educational data from the Centre for Educational Assessment (Pusmenjar, 2019) indicate that English achievement among vocational students remains below the expected national

standard. This situation suggests that existing instructional approaches have not yet effectively supported the development of students' communicative competence, particularly in speaking performance.

From a pedagogical perspective, speaking is widely recognized as one of the most complex language skills. According to Brown (2004) and Thornbury (2005), speaking requires real-time processing in which learners must simultaneously generate ideas, retrieve vocabulary, apply grammatical structures, and produce comprehensible utterances. Similarly, Harmer (2007) emphasizes that effective speaking depends not only on linguistic knowledge but also on learners' ability to organize ideas logically before and during speech production. These cognitive and linguistic demands make speaking particularly challenging for learners who have limited experience in organizing ideas spontaneously.

Previous studies have emphasized that speaking difficulties are common among learners due to the complexity of coordinating linguistic elements during real-time communication. For example, Anwar et al. (2023) explain that speaking is often considered one of the most challenging skills for language learners because it requires the simultaneous management of vocabulary, grammar, and pronunciation. In addition to linguistic challenges, learners' willingness to communicate also influences their participation in speaking activities. Research by Artha et al. (2024) indicates that students who demonstrated higher willingness to communicate tend to participate more actively in classroom interactions. In contrast, learners with low confidence frequently avoid speaking opportunities.

The complexity of speaking can also be explained from a cognitive perspective. Based on the Cognitive Load Theory proposed by Sweller (1988), learning becomes less effective when the cognitive demands of a task exceed the learners' working memory capacity. During speaking activities, learners must generate content, organize ideas, and produce language simultaneously. When these processes occur without adequate support, learners may experience cognitive overload, resulting in hesitation, disorganized speech, or reduced fluency. Therefore, instructional strategies that help learners structure ideas before speaking may play an important role in reducing cognitive burden and facilitating more effective oral production.

One approach that can support idea organization in language learning is the use of visual scaffolding. Visual learning tools allow learners to represent ideas in structured forms, helping them conceptualize the relationship between events and concepts before producing language. Among various forms of visual scaffolding, storyboards have been widely used as a planning tool in language learning. A storyboard is a sequence of visual panels that represent key events or ideas in a narrative structure (Wahid & Aziz, 2022). By arranging ideas visually, learners can externalize abstract concepts and organize them into a coherent sequence before speaking. This structured planning process allows learners to focus on one idea at a time, which may reduce cognitive overload during speech production. In addition, pedagogical research by Hamdani et al. (2023) highlights that structured instructional strategies supported by visual media can enhance students' engagement and participation in English learning activities. Consequently, storyboard-based activities can support learners in constructing more coherent and fluent oral explanations.

Empirical studies have demonstrated the potential benefits of storyboard-based learning in language classrooms. Ramasari et al. (2021) investigated the implementation of storyboard-based project learning and reported that students' fluency and coherence improved because they were able to visualize and structure their ideas before speaking. Similarly, Abizaid and Al Kayed (2020) found that storyboard planning improved learners' comprehension and organizational skills by providing a clear framework for understanding narrative structure.

Although previous studies have demonstrated the potential of storyboard-based instruction, several limitations remain. Most studies have been conducted in general

secondary school contexts rather than vocational education, where students face different communication demands related to professional environments. In addition, many studies examining storyboard-based activities focus primarily on qualitative classroom observation or students' perceptions, providing limited empirical evidence regarding measurable improvements in speaking performance.

Furthermore, previous research commonly employs paper-based storyboards. With the rapid technology, storyboard activities can now be implemented through digital platforms that provide more interactive visual features. One example is Storyboard That, an online digital storyboard platform that allows students to create a visual story sequence using characters, scenes, and dialogue through an interactive interface. Such digital tools may provide additional opportunities for learners to organize ideas more flexibly and creatively before performing speaking tasks. However, empirical research investigating the effectiveness of digital tools in improving students' speaking performance remains limited.

Based on these considerations, this study aims to investigate whether the implementation of digital-based instruction using the Storyboard that platform can significantly improve vocational high school students' speaking performance within a vocational education context. This study contributes to the growing body of research on visual scaffolding and technology-supported language learning.

METHOD

This study employed a quantitative approach using a pre-experimental design, specifically a one-group pretest–posttest model. This design was selected to examine the effectiveness of digital storyboard-based instruction on students' speaking skills by comparing their performance before and after the treatment. The use of a pre-experimental design was considered appropriate because the researcher had access to only one intact classroom and was not permitted to reorganize students into separate control and experimental groups due to school scheduling and administrative constraints. In such educational contexts, where random assignment and control groups are difficult to implement, the one-group pretest-posttest design provides a practical approach to examining instructional effectiveness by measuring students' performance changes following the intervention (Creswell, 2015).

Table 1. Research Design Models

Group	Pre-Test	Treatment	Post-Test
Experimental Group	Q1	X	Q2

The following is a description of the research design:

Q1 = The test is administered to students at the start of their education to assess their speaking abilities in the narrative text content.

X = Using the storyboard as a teaching tool

Q2 = Students take the test at the conclusion of their education after using a storyboard to study the narrative text material to determine whether they have changed since receiving treatment.

A speaking pre-test (Q1) was given to students before any treatment, in accordance with the previously described research design. Storyboards are used as a learning tool to implement treatment (X) following receipt of the pre-test results. "Storyboard That" was used in this study as a digital learning tool to administer the treatment. A post-test (Q2) was used to assess the impact of using storyboards on students' speaking performance following the administration of the treatment. After that, the post-test results were examined to see if using storyboards significantly improves the speaking abilities of vocational high school students.

Participants

The participants of this study were 36 tenth-grade students enrolled in a compulsory English as a Foreign Language (EFL) course at a public vocational high school (SMK) in Sidoarjo, Indonesia. These students were considered appropriate participants due to the communicative demands of vocational education, which require learners to develop practical speaking skills for future workplace contexts. The participants were selected using purposive sampling based on several criteria relevant to the research objective. The students were enrolled in Grade 10 and were studying narrative texts as part of the English curriculum. They belonged to the same intact classroom to ensure consistent instructional exposure during the interventions and had not previously experienced storyboard-based instruction in their English learning. The selected class was X DPIB 2 (Design of Building Information Modelling), which was chosen based on accessibility and teacher recommendation, allowing the researcher to implement the instructional intervention within a regular classroom setting. The study was conducted following ethical research principles. Permission to conduct the study was obtained from the school authorities, and all participants were informed about the research procedures. Students' participation was voluntary, and confidentiality of their data was assured.

Instruments

The primary research instrument used in this study was a speaking performance test, administered as both a pre-test and a post-test. The speaking tasks required students to produce oral narratives based on visual prompts related to narrative texts. The tasks were designed in accordance with the learning objectives of the Grade 10 English curriculum under the Merdeka Curriculum, with particular emphasis on students' ability to retell narrative stories orally. Students' speaking performance was assessed using an analytical speaking rubric adapted from Brown and Abeywickrama (2010). The adaptation specifically referred to the assessment criteria and scoring scale used to evaluate students' speaking performance. The rubric consisted of five components: pronunciation, grammar, vocabulary, fluency, and coherence, each rated on a five-point scale ranging from 1 (very poor) to 5 (excellent). In the original rubric, the fifth components is comprehension. However, in this study, this component was adapted into coherence to better capture students' ability to organize and connect ideas logically in narrative speech, which aligns with the objectives of storyboard-based instruction.

To ensure content validity, the speaking test and scoring rubric were reviewed through expert judgment by an experienced English teacher at a public vocational high school in Sidoarjo. The expert evaluated the alignment between the test prompts and the learning objectives, the clarity of the task instruction, and the appropriateness of the rubric indicators for assessing students' narrative speaking ability. Based on the expert's feedback, minor revisions were made to improve the clarity of the instruction and to ensure the prompts effectively elicited students' narrative speech. Content validity through expert judgment is commonly used to ensure that the research instrument adequately represents the construct being measured (Fraenkel et al., 2012). To establish inter-rater reliability, students' speaking performance was independently assessed by two rates: the researcher and the English teacher. The level of agreement between two rates was analysed using Cohen's Kappa coefficient. The analysis produced was used to determine the consistency of the scoring between two rates.

Data Collecting Technique

A quantitative method with a pre-experimental design, specifically, a one-group pre-test and post-test model, was employed in this study to examine the effect of digital storyboard-based instruction on students' speaking ability. This design involves measuring students' performance before and after the instructional treatment to identify potential changes in

their speaking performance (Creswell, 2014). Pre-test, treatment, and post-test were the three primary phases of data collection in this design.

Week 1 – Pre-test Administration

The pre-test was administered before the treatment to measure students' initial speaking ability. Students were required to deliver an oral narrative based on a visual prompt depicting a simple narrative situation related to everyday experiences. Each student was given one minute for preparation and a maximum of three minutes for oral presentation, given a picture related to a personal experience. All students received the same visual prompt during pre-test to ensure consistent assessment conditions. The prompt consisted of six sequential images representing a short narrative event. The images were designed to elicit a narrative structure consisting of orientation, complication, and resolution, which corresponds to the narrative text structure taught in the Grade 10 English Curriculum. The visual helped students organize their ideas and construct a coherent narrative during their oral performance. Students' speaking performances were assessed directly during their presentations by two raters. Each rater independently evaluated the students' performance using an analytical speaking rubric adapted from Brown and Abeywickrama (2010), which assessed five aspects of speaking: pronunciation, grammar, vocabulary, fluency, and coherence.

Week 2 to 4 – Treatment Phase

The treatment consisted of three instructional sessions using digital storyboards via the platform "Storyboard That." Students were introduced to narrative text structure and guided in organizing ideas visually through storyboards. They developed narratives by transforming storyboard frames into coherent oral stories, with teacher guidance and peer feedback.

a. Treatment Procedure

Week 2 - Introduction to Narrative Text and Storyboard Use

During the first treatment session, students were introduced to narrative texts, focusing on their social function, generic structure, and language features. The researcher demonstrated how ideas could be organized using a digital storyboard through the Storyboard That platform. Students then worked collaboratively in small groups to complete a storyboard template based on a short narrative provided by the teacher. This activity aimed to familiarize students with visual sequencing and idea development.

Week 3 - Developing Narrative Drafts through Storyboards

In the second treatment session, students developed their storyboard outputs into complete narrative drafts. Each image in the storyboard was transformed into sentences and paragraphs with guidance from the researcher. Instruction emphasized coherence, appropriate vocabulary use, and grammatical accuracy. Students revised their drafts individually, after which selected students presented their narratives and received feedback from the teacher and peers.

Week 4 – Oral Presentation and Speaking Practice

The third treatment session focused on oral speaking practice. Students delivered oral presentations based on their finalized storyboards and narrative drafts. Before presenting, students were given time to review and outline their stories. The activity aimed to enhance fluency, pronunciation, and confidence in spoken English by using visual support from the storyboard.

Week 5 – Post-test Administration

After the completion of the treatment sessions, the post-test was administered to measure students' speaking performance after the instructional intervention. The procedure was identical to the pre-test: students were asked to deliver an oral narrative based on a visual prompt, with one minute of preparation and a maximum of three minutes for oral presentation. The visual prompts also consisted of six sequential images, identical to those used in the pre-test. Using the same visual prompt ensured that the task difficulty, visual information, and narrative structure remained consistent across both assessments, allowing a more accurate comparison of students' speaking performance before and after the instructional treatment. Similar to the pre-test procedure, students' speaking performances were evaluated directly during presentation by two raters, and they used the same analytical speaking rubric adapted from Brown and Abeywickrama (2010) to ensure consistent evaluation criteria.

Data analysis

The data were analyzed using SPSS version 27.0 to address the research question concerning the effectiveness of digital storyboard instruction on students' speaking skills. Both descriptive and inferential statistical techniques were employed to ensure accurate interpretation of the findings.

Reliability (Inter-Rater Reliability)

To ensure the consistency of the speaking assessment, an inter-rater reliability test was conducted. The students' speaking performance was independently evaluated by two raters, namely the researcher and an experienced English teacher. Inter-rater reliability was calculated using Cohen's kappa coefficient, which is commonly used to measure the level of agreement between two raters when independently evaluating the same students' speaking performances using the same scoring rubric.

Descriptive Statistic

To provide an overview of students' speaking performance, descriptive statistics were calculated for both the pre-test and post-test scores. Descriptive statistics were used to summarize the central tendency and variability of the data. The analysis included the calculation of the mean score, standard deviation, and difference score to illustrate the students' speaking performance before and after the instructional treatment.

Normality Test (Shapiro-Wilk)

Before hypothesis testing, a normality test was conducted to determine whether the pre-test and post-test speaking scores were normally distributed. Given that the sample size consisted of fewer than 50 participants, the Shapiro–Wilk test was applied, as recommended for small samples (Mishra et al., 2019). The significance level was set at $\alpha = 0.05$. The results indicated that the data did not meet the assumption of normal distribution ($p < 0.05$), thereby necessitating the use of non-parametric statistical procedures for further analysis.

Hypothesis Testing (Wilcoxon Signed-Rank Test)

Since the normality assumption was violated, the Wilcoxon Signed-Rank Test was used to examine whether there was a statistically significant difference between students' speaking performance before and after the treatment. This test is appropriate for comparing two related samples in a one-group pre-test–post-test design. The analysis aimed to determine whether digital storyboard-based instruction produced a meaningful improvement in students' speaking skills. The null hypothesis was rejected when the obtained significance

value was less than 0.05, indicating a statistically significant improvement following the intervention.

Effect Size Analysis

In addition to statistical significance testing, an effect size analysis was conducted to evaluate the magnitude and practical significance of the treatment effect. While the p-value indicates whether a significant difference exists, it does not reflect the strength of the intervention. Therefore, Cohen's d (Cohen, 1988) was calculated using the pooled standard deviation and the mean difference between the pre-test and post-test scores. According to Cohen's guidelines, the effect size was interpreted as moderate to large, suggesting that the digital storyboard intervention had not only a statistically significant effect but also a meaningful educational impact on students' speaking performance.

RESULTS

Reliability (Inter-Rater Reliability)

To ensure the consistency of the speaking assessment, an inter-rater reliability test was conducted using Cohen's Kappa. The analysis aimed to measure the level of agreement between the two raters who evaluated students' speaking performance using the adapted speaking rubric.

Table 2. Inter-Rater Reliability

Measure of Agreement	N	Kappa	Sig. (p-value)
Cohen's Kappa	36	0.508	< .001

Table 2 presents the result of the inter-rater reliability analysis. The Cohen's Kappa coefficient was 0.508 with a significance level of $p < .001$ based on 36 rated samples. This value indicates a moderate level of agreement between the two raters, suggesting that the speaking assessment produced consistent scoring.

Descriptive Statistics

Descriptive statistics were employed to summarize students' speaking performance before and after the implementation of digital storyboard-based instruction.

Table 3. Descriptive Statistics

Test Type	N	Mean	Std. Deviation
Pre-test	36	45.06	17.64
Post-test	36	57.06	16.21
Difference Score	36	11.99	8.75

As shown in Table 3, students' speaking performance improved after the instructional treatment. The mean pre-test score was 45.06 (SD = 17.64), which increased to 57.06 (SD = 16.21) in the post-test. The average gain score was 11.99, indicating an overall improvement in students' speaking performance following the implementation of storyboard-based instruction.

Improvement Across Speaking Components

To further examine which aspects of speaking were most influenced by the storyboard-based instruction treatment, the students' speaking scores were analyzed across five components: fluency, coherence, pronunciation, vocabulary, and grammar.

Table 4. Mean Score of Speaking Components

Component	Pre-test Mean	Post-test Mean	Mean Gain
Fluency	12.50	16.50	4.00

Coherence	12.50	16.25	3.75
Pronunciation	9.44	12.11	2.67
Vocabulary	6.92	8.00	1.08
Grammar	3.56	4.17	0.61

The results in Table 4 show that students' speaking performance improved across all assessed components after the implementation of digital storyboard-based instruction. The greatest improvement was observed in fluency and coherence, followed by pronunciation, while vocabulary and grammar showed relatively smaller gains. These findings suggest that storyboard-based instruction particularly supported students' ability to organize ideas and speak more smoothly in narrative tasks

Test of Normality

The Shapiro–Wilk test was conducted to examine the normality of the pre-test, post-test, and difference score distributions before selecting the appropriate statistical analysis.

Table 5. Normality Test

Test Type	N	Statistic	Sig. (p-value)
Pre-test	36	0.953	0.132
Post-test	36	0.975	0.567
Difference Score	36	0.923	0.016

As presented in Table 5, the results indicate that the pre-test ($p = 0.132$) and post-test scores ($p = 0.567$) were normally distributed ($p > 0.05$). However, the difference scores did not meet the normality assumption ($p = 0.016$). Therefore, a non-parametric statistical test was considered more appropriate for further analysis.

Hypothesis Testing (Wilcoxon Signed-Rank Test)

Because the differences in scores did not meet the normality assumption, the Wilcoxon Signed-Rank Test was employed to examine this study.

Table 6. Wilcoxon Signed-Rank Test

Ranks	N	Mean Rank	Sum of Ranks
Negative Ranks	0	0.00	0.00
Positive Ranks	36	18.50	666.00
Ties	0	—	—

The rank analysis revealed consistent in improvement among students. All 36 students obtained higher scores in the post-test compared to the pre-test, as indicated by absence of negative ranks and ties.

Table 7. Wilcoxon Signed-Rank Test Result

Test	N	Z	Sig. (2-tailed)
Post-test – Pre-test	36	−5.233	< .001

Furthermore, the Wilcoxon Signed-Rank Test produced a Z value of −5.233 with a significance level of $p < .001$. Since the p-value was below the significance threshold of 0.05, the null hypothesis was rejected. This result indicates that digital storyboard-based instruction significantly improved students' speaking skills.

Effect Size

To determine the magnitude of the instructional impact, an effect size analysis using Cohen's d was conducted. Based on the mean gain score between the post-test and pre-test ($M = 11.99$) and the pooled standard deviation ($SD = 16.94$), the effect size was calculated

at d = 0.71. According to Cohen's (1988) criteria, this value represents a moderate to large effect. This finding indicates that digital storyboard-based instruction not only produced statistically significant improvement but also had a meaningful practical impact on students' speaking performance.

DISCUSSION

The findings of this study revealed a statistically significant improvement in students' speaking performance after the implementation of digital storyboard-based instruction. The Wilcoxon Signed-Rank Test indicated a significant difference between pre-test and post-test scores (mean pre-test = 45.06; mean post-test = 57.06; $Z = -5.233$, $p < .001$). These results support the hypothesis that digital storyboard-based instruction using Storyboard That Platform can improve vocational high school students' speaking skills. Within the limitations of a one-group pretest-posttest design, the results indicate that students' speaking performance after the treatment consistently differed from their initial performance.

One possible explanation for this improvement is the role of storyboards as visual planning tools that help students organize ideas before speaking. By dividing narratives into sequential visual segments, storyboards may assist narratives more smoothly. This interpretation is consistent with the findings of Ramasari et al. (2021), who reported that storyboard activities help learners produce more coherent oral narratives. Similarly, Wahid and Aziz (2022) highlight that storyboards promote engagement, creativity, and logical concept development through visual planning.

The findings also support the view that visual scaffolding can reduce the cognitive load associated with real-time speech production. When learners rely on visual prompts, they can focus more on language expression rather than generating ideas simultaneously (Sun, 2024; Kadwa & Alshenqeeti, 2020). As a result, students may experience fewer pauses and demonstrate improved fluency and coherence during the speaking task. In addition, the use of a digital storyboard tool such as Storyboard That may enhance students' motivation and participation in speaking activities, as multimedia features and visual prompts can make the learning process more engaging (Robin, 2008; Rintaningrum, 2023).

However, these findings should be interpreted cautiously because the study employed a pre-experimental one-group design without a control group. Therefore, the observed improvement cannot be attributed solely to the storyboard intervention, as other factors such as instructional time or task familiarity may also influence the results. Future research using a controlled experimental design is recommended to further examine the effectiveness of digital storyboard-based instruction and to identify which storyboard features most strongly contribute to improvement in specific components.

Practically, the results suggest that digital storyboard-based instruction using the Storyboard That platform can serve as a useful scaffolding tool for teaching speaking in vocational high school contexts. By helping students organize ideas before speaking, a storyboard may support learners in producing more coherent and fluent oral narratives.

CONCLUSION

Digital storyboard-based instruction produced a statistically significant improvement in the speaking performance of vocational high school students, as indicated by the difference between pre-test and post-test scores. The findings suggest that using digital storyboards on the Storyboard That platform can help students organize their ideas before speaking and facilitate more structured oral narrative production. These results indicate that digital storyboards can function as visual scaffolding tools that assist students in preparing and presenting spoken narratives. Although the study employed a pre-experimental design without a control group, the findings provide initial evidence that integrating digital storyboard-based instruction may support speaking development in vocational high school

contexts. From a pedagogical perspective, the integration of structured visual and technology-assisted media may provide teachers with an alternative strategy for supporting vocational EFL speaking instruction. Future studies using a more rigorous experimental design are recommended to further investigate the effectiveness of digital storyboard-based instruction and to examine its impact on speaking components.

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